

# *The* Southern Surgeon

Subscription in the United States, \$4.00

---

VOLUME V

OCTOBER, 1936

NUMBER 5

---

## THE SURGICAL TREATMENT OF ENCAPSULATED INTRATHORACIC TUMORS

Report of Two Cases

JULIAN A. MOORE, M. D.

Asheville, N. C.

An apparent increase in the incidence of intrathoracic neoplasms is probably the result of better diagnosis made possible by the more general use of bronchoscopy and radiography. The profession in general maintains a hopeless attitude toward the treatment of tumors within the chest regardless of their kind or location.

Malignant tumors occurring within the thorax are rarely cured by any means at our disposal, although there has been reported the successful removal of a number of malignant neoplasms, including carcinoma of the lung itself. However, not infrequently there do occur primary tumors within the thorax which are quite readily removed by surgical means.

These tumors occur as primary growths which are usually benign, although some eventually become malignant and invade the surrounding structures. They are found most frequently in the superior mediastinum, projecting laterally into the right or left thorax, but they may be located in any part of the chest. They are extrapulmonary and usually definitely encapsulated, but they may be densely adherent to the lung or surrounding structures. They cause no harm until their size is sufficient to interfere with the function of the lungs or mediastinal structures, or until they have become malignant and invade other organs.

Roentgenographically they are seen as circumscribed, dense areas with sharply defined borders. Pathologically they represent a wide variety of tumors, namely: dermoid cyst, teratoma, neurofibroma, ganglioneuroma, fibroma, myxoma, sarcoma, lipoma, osteochondroma, chondroma, hygroma, and xanthoma. The most common types are dermoid cyst and teratoma, followed in frequency by

Read before the Seventh Annual Assembly of The Southeastern Surgical Congress, in New Orleans, March 9, 10 and 11, 1936.

neurofibroma. Tumors such as thymoma, lymphoblastoma and Hodgkin's disease are not included in this list, as they are definitely malignant and invasive from the beginning and are not amenable to surgical removal.

There are no characteristic symptoms or signs of intrathoracic tumors. Many of them are very slow in growth, and produce no symptoms until they become large enough to cause pressure. Frequently they are discovered accidentally. These symptoms depend on the size and situation of the mass, and may be divided into two groups: those due to pressure on surrounding structures, producing interference with function, and those due to inflammatory reactions in the tumor itself or in adjacent organs.

Probably the most common initial symptom is pain, generally intermittent and localized within the chest. It may radiate along the intercostal nerves or down an arm, gradually becoming constant in character. Harrington<sup>1</sup> states that severe pain is much more characteristic of malignant than of benign lesions. Dyspnea on exertion is the next most common symptom. As the tumor grows large enough to produce obstruction to the large veins, the trachea or bronchi, dyspnea becomes more pronounced and is accompanied by cyanosis. Enlargement of the superficial cervical and thoracic veins, accompanied by cyanosis of the face and upper extremities, is characteristic of superior vena caval obstruction.

Cough and expectoration are not marked unless pulmonary infection supervenes. Dermoid cysts have been known to rupture into the trachea or a bronchus. Such an accident is followed by the expectoration of hair and sebaceous material, and is pathognomonic.

Pressure on an intercostal nerve leads to pain along its course, and is erroneously considered as intercostal neuralgia or pleurisy. Pressure on the recurrent laryngeal nerve produces hoarseness; on the sympathetic nerves it may produce a Horner's syndrome; and on the esophagus it will produce dysphagia.

Bulging of the chest wall is not a common finding, and is more likely to be seen in children. Pleural effusion may be present with benign tumors, but a bloody effusion is characteristic of malignant tumors. Anemia and loss of weight are late signs of malignancy.

Physical examination will reveal abnormal physical signs commensurate with the size and position of the tumor. An abnormal area of dulness with diminished breath sounds and inconstant rales is usually found. If a pleural effusion or pulmonary infection exists, the signs of such complications will entirely overshadow those of the tumor and lead to confusion. The presence of bulging of the

chest wall, cyanosis and enlarged veins are rather characteristic of large growths.

The most valuable diagnostic method is the roentgen ray, as the diagnosis of intrathoracic tumors cannot be made without its use. As a matter of fact, many intrathoracic tumors are never suspected until revealed by roentgen ray studies. Stereoscopic and lateral roentgenograms will reveal the presence of a definitely circumscribed area of density, with its relationship to other organs and its exact location within the thorax. Fluoroscopy sometimes establishes the presence or absence of pulsation in the tumor, and is of great aid in differentiating new growths from aneurysms. Roentgenograms after the introduction of artificial pneumothorax give important information about the relationship of the tumor to the lung, and help to distinguish between intra- and extrapulmonary tumors. Bronchoscopic examination and roentgenograms after the instillation of iodized oil into the tracheobronchial tree are distinctly useful in the differentiation of intra- and extrapulmonary growths.

Intrathoracic tumors must be differentiated from aneurysm first of all. Serologic tests and the presence or absence of pulsation within the mass, as revealed by the fluoroscope, will usually distinguish between the two.

Loculated collections of fluid or pus may be very confusing, and aspiration may fail to differentiate between tumor and effusion, as frequently the tumor may be cystic or may be complicated by an effusion or empyema. Sometimes the diagnosis can only be established at operation.

Hydatid cysts occur most frequently within the lung itself. A skin sensitization test may establish the presence of this disease.

Certain malignant growths are radiosensitive, especially Hodgkin's disease and lymphoblastoma, and it is wise to submit all patients to a preliminary course of roentgen therapy before operation. If the tumor is radiosensitive, in all probability it is malignant and inoperable. Unfortunately, all malignant tumors are not radiosensitive. Tumors of the group under discussion are not radiosensitive, but this does not mean that all are benign. It is often impossible to differentiate between a benign or malignant tumor except by biopsy. An exploratory operation is always justifiable, particularly when most of the evidence leads one to believe the tumor is resectable.

Since all intrathoracic tumors are potentially malignant, surgical removal of these new growths as soon as they are diagnosed is the only proper treatment. The earlier the tumor is removed, the

greater is the chance for complete and successful cure. To wait until the tumor becomes so large as to produce serious disturbances of respiration or circulation makes the operation extremely hazardous, and greatly lessens the chance of successful removal.

The technical problems encountered are important, and should be carefully considered. The chief danger of the operation is the effects of a large, open pneumothorax. With the pleura widely opened, there is a rapid loss of body heat. Therefore, no time should be wasted, and the operation should be completed as rapidly



Fig. 1. Posteroanterior roentgenogram showing the small circumscribed shadow in the right upper chest. (Case 1.)

as is consistent with good surgery. Cardiac and respiratory embarrassment due to mediastinal flutter can be avoided by using differential pressure anesthesia given intratracheally. This is the only type of anesthesia that should be considered. Part of the ill effects of a sudden, large pneumothorax can be avoided by the establishment of artificial pneumothorax several days before operation.

The surgical approach to the tumor must be through the bony thoracic wall. Tumors in the anterior and superior mediastinum are approached through some type of anterior mediastinotomy. The costal cartilages are resected, and the sternum divided horizontally or split vertically. Tumors in the lateral portion of the chest are best approached through an intercostal incision directly over the tumor. For tumors located in the posterior mediastinum or upper



portion of the chest a posterolateral incision with resection of one rib and division of one or more ribs and a wide opening of the pleura offers the best approach. Harrington<sup>2</sup> prefers the posterolateral transpleural approach in nearly all types and locations. He further states that an extrapleural approach is usually not practical or satisfactory, as the pleura will be opened in any event. A large denuded area is left which is more likely to become infected, or which may cause large and troublesome postoperative effusions.

Careful dissection of the tumor from surrounding structures is essential. Injuries to the lung can easily be repaired, but injuries to mediastinal structures are more likely to be fatal. After removal of the tumor, hemostasis must be complete. The pleural cavity



Fig. 2. Posteroanterior roentgenogram showing condition of patient on Sept. 28, 1934, five years after operation. (Case 1.)

should be irrigated with warm normal saline solution. The opening into the pleura should be closed tightly, and just before the last stitch is placed in the pleura the lung should be expanded. The ribs that have been divided should be sutured together, and the soft tissue closed layer by layer.

There is a justifiable difference of opinion as to whether the pleural cavity should be drained or not. Harrington<sup>2</sup> states that it should only be drained in the presence of infection. On the other hand, cases have been reported on patients who died from extensive subcutaneous and mediastinal emphysema following operation. Whenever there has been an injury to the lung or the pleural defect cannot be successfully closed, I believe a small rubber tube inserted

through a stab wound between the ribs and its outer end placed under water will safeguard against this occasionally fatal complication. It need not be left in more than twenty-four hours, and I do not believe it greatly increases the risk of infection.

Strict attention to details in the treatment during the postoperative course is absolutely essential to a successful outcome. Shock should be combated with intravenous injections of glucose solutions, 6 per cent acacia solutions, or blood transfusions. Blood pressure should be maintained. It is wise to have a donor available at the time of operation.

Respiratory and circulatory embarrassment are best relieved by placing the patient under an oxygen tent and keeping him there until entirely relieved. Cardiac failure, of course, calls for stimulation as indicated. Pleural effusions that embarrass respiration should be aspirated as often as necessary. Tension pneumothorax is best relieved by inserting a small rubber tube between the ribs and placing the outer end under water. Infection of the pleural cavity should be drained by either an intercostal tube or rib resection.

#### REPORT OF CASES

CASE 1. A girl of 18 was referred to me by Dr. P. P. McCain, Sanatorium, N. C., on Oct. 15, 1929, complaining of afternoon fever. While having a physical examination in July, 1929, it was discovered that she ran an afternoon fever of 99° to 100.6°, without any other symptoms. Her tonsils were removed, but the fever persisted with no loss of weight. Dr. McCain, by roentgen examination, found an abnormal shadow in the right upper chest. About Oct. 1, 1929, she began to complain of intermittent, sharp and aching pains in the right upper chest. Her past history and family history were essentially negative, and threw no light on the condition.

She was a well nourished and well developed young woman. Her general physical examination was entirely negative. Her heart was normal in size and outline, and her blood pressure was 100 systolic and 70 diastolic (left arm). There was a small area of dulness just to the right of the fifth and sixth vertebra. In this area breath sounds were slightly diminished, and a few fine rales were heard after coughing. Throughout the rest of the right lung, physical signs were normal.

Her hemoglobin was 80 per cent (Dare); erythrocytes 4,800,000; leukocytes 9,800; neutrophils 68 per cent; lymphocytes 28 per cent; mononuclears 4 per cent; her blood Wassermann was negative. Urine examination was negative.

Roentgenograms (Fig. 1) revealed a small circumscribed dense area lying next to the fifth and sixth vertebrae and against the fifth and sixth ribs. An area of erosion was seen in the fifth rib. Stereoscopic films showed the mass to be behind the lung. Oblique films showed it to be posterior and lying next to the ribs and vertebra.

A diagnosis of neurofibroma was made and removal advised.

On Nov. 30, 1929, under nitrous oxide and oxygen anesthesia, a curved incision was made paravertebrally. The trapezius and rhomboid muscles were divided, and all bleeding points ligated. Twelve centimeters of the fourth, fifth, and sixth ribs were removed subperiosteally from the transverse processes outward. The tumor was immediately exposed as a portion of it projected between the fifth and sixth ribs. The periosteal bed of the fifth rib was incised, and the capsule of the tumor presented itself. The tumor was separated easily from the vertebral bodies and from the ribs. While separating it from the pleura, a small tear was made. Apparently the tumor arose from a sympathetic ganglion. Free oozing of blood was controlled by a hot pack. The tear in the pleura was repaired by fine catgut sutures. The wound was closed in layers without drainage and 1800 c.c. of air was withdrawn from the right chest at the close of the operation.



Fig. 3. Photograph of actual tumor removed from patient. Diagnosis: ganglioneuroma. (Case 1.)

The patient was returned to her room in good condition. Her blood pressure was 80 systolic and 60 diastolic; pulse 80 per minute. Her convalescence was stormy. On December 1, her temperature rose to 101°, pulse 114, respiration 32. A thoracentesis of 750 c.c. of air and 150 c.c. of bloody fluid relieved the slight dyspnea. Slight subcutaneous emphysema was noted. Her temperature, pulse, and respiration continued high. On December 4, 550 c.c. of bloody fluid and 200 c.c. of air were removed, but this did not reduce temperature. A culture of pleural fluid was negative. On the 5th, as the wound looked angry, several stitches were removed and pus obtained. Her temperature became septic in type. The next day the laboratory technician reported tubercle bacilli in the pleural fluid. Her condition became somewhat better, and repeated attempts were made to aspirate fluid from her chest, but none could be obtained. Blood cultures were negative. Leukocyte count varied from 20,000 to 30,000, and neutrophils from 80 to 85 per cent. Empyema was suspected. Roentgen examination showed what was apparently a loculated collection of pus around the tumor site, but pus was not obtained on repeated aspirations.

This condition continued for several weeks. The patient had periods of several days of freedom from fever and then several days of fever. Because the laboratory had reported tubercle bacilli in the pleural fluid, a tentative diagnosis of acute tuberculosis was made. Yet neither my consultant nor I was satisfied with the diagnosis as empyema was strongly suspected. Finally by aspiration, pus was located and drained on January 16, 1930. The patient promptly recovered, and has remained well ever since. Figure 2 is a roentgenogram of her chest taken Sept. 28, 1934.

Pathologic report of the tumor removed (Figure 3), made by Dr. J. B. Bullitt, of Chapel Hill, N. C., is as follows:

"The tissue consists of an intricate tangle of bundles of fine fibers, which are accompanied by a moderate number of spindle shaped cells; large round,



Fig. 4. Posteroanterior roentgenogram showing large circumscribed mass in left lower chest. (Case 2.)

oval and irregularly shaped cells are sparsely scattered throughout, and are gathered in groups here and there. The fibers are partly nerve fibers and partly neuroglia fibers. The surface is covered by a thin capsule.

"Diagnosis: Ganglioneuroma."

*Comment:* This case illustrates what Harrington<sup>2</sup> has to say of the extrapleural approach. In this patient, the pleura was torn, and a large denuded area was left which became infected, the infection spreading to the pleural cavity. It also illustrates how extremely difficult at times it is to locate a sacculated empyema, even with the aid of the roentgen rays, which were most confusing in this patient.

CASE 2. A cotton mill machinist, aged 29, was referred to me by Dr. P. P. McCain, Sanatorium, N. C. His chief complaint was pain in his left side.



Since an attack of influenza in 1931, he had been more subject to colds, and these colds had been usually accompanied by some pain in the left posterior chest. He did not notice the pain except when he had a cold. After another attack of influenza in 1933, his colds had become more frequent and pain more severe. He lately had complained of a burning sensation within the chest. Frequently on exertion a pain caught him, and he had to stop for a few minutes. He had no cough or expectoration except when he had a cold. His general health had been good. He had lost eight pounds within the past few months.



Fig. 5. Lateral roentgenogram showing mass to be posterior in the left chest. (Case 2.)

He had had measles, mumps, whooping cough, chicken pox and diphtheria in childhood. In 1925 he had an attack of influenza and pleurisy, but he does not recall which side was involved. He had several attacks of renal colic prior to 1926, when a right nephrectomy was done for hydronephrosis. In 1928 a stone was removed from his bladder. His family history was irrelevant.

He was a well nourished young man. His heart was normal in size and outline, and the sounds were normal. His blood pressure was 110 systolic and 80 diastolic. His right lung was normal. Posterolaterally over the eighth, ninth and tenth ribs on the left side, the percussion note was impaired, the breath sounds were diminished, and a few inconstant, dry rales were heard. The scar of the right nephrectomy was present. Roentgen ray examinations made at the North Carolina Sanatorium for Tuberculosis revealed a large circumscribed area of density in the left lower chest. It was two inches above the diaphragm, its inner border nearly touched the heart, and its lateral border was next to the ribs. Oblique and lateral films showed the tumor to be in the posterior portion of the chest. Fluoroscopic examinations revealed no pulsation, and showed that the tumor did not touch the heart or vertebral bodies.

Figures 4 and 5 show the posteroanterior and lateral roentgenograms of this patient.

His hemoglobin was 80 per cent (Dare); erythrocytes 4,700,000; leukocytes 8,850: neutrophils 72 per cent, lymphocytes 26 per cent, eosinophils and basophils each 1 per cent. His blood Wassermann reaction was negative; his non-protein nitrogen 30 mg. per 100 c.c. of blood, and his stools negative for parasites and ova. Urinalysis was essentially negative.

Before admission to the Biltmore Hospital he had received a preliminary course of roentgen therapy, with no diminution in the size of the tumor.

A provisional diagnosis of a benign intrathoracic tumor, probably neurofibroma, was made.



Fig. 6. Photograph showing tumor removed from Case 2. The tumor is collapsed until it is approximately one-half of its original size. Diagnosis: endothelioma of pleura.

On Dec. 10, 1935, the left phrenic nerve was crushed. On the 12th, under avertin given rectally and nitrous oxide oxygen and ether anesthesia given intratracheally, a long, curved incision was made over the seventh to tenth ribs. All bleeding points were coagulated. The ninth rib was resected subperiosteally from the transverse process to the posterior axillary line. A much thickened periosteum was incised, and the tumor felt underneath. To gain more room the eighth rib was resected, and the tenth rib was divided and retracted. The tumor seemed to be both intra- and extrapleural. The pleura was opened, and the medial portion of the tumor was found to be cystic and adherent to the left lower lobe. The lateral portion was solid, and could not be separated from the parietal pleura, but was easily separated from the periosteum of the ribs and intercostal muscles. The cyst was ruptured, and contained serosanguinous fluid and degenerated tissue. The cystic portion was easily separated from the lung, leaving a raw surface, which was covered by suturing the edges of the area together. A section of parietal pleura, about 8 by 6 cm. had to be removed together with the tumor (Figure 6). This left a defect in the pleura, which I could not close except by suturing the left lower lobe of the lung to the pleural defect. A small rubber tube was inserted into the tenth interspace, and the wound was closed in layers. He left the operating

table in one hour and fifty minutes, with a pulse of 80 and a blood pressure of 100 over 70. The end of the rubber tube was placed under water. He drained about 300 c.c. of a bloody fluid and some air. At the end of 12 hours the tube was removed. His convalescence was entirely uneventful except for considerable pain in the operative area for several days. He did not develop a pleural effusion, and he was discharged from the hospital Dec. 28, 1935.

He was examined by me on Feb. 15, 1936. He had returned to work, and was in good health. Roentgenograms (Figure 7) taken on that day revealed the lung to be re-expanded and no evidence of recurrence.



Fig. 7. Posteroanterior roentgenogram taken Feb. 15, 1936, two months after operation. The eighth and ninth ribs have not regenerated. There is no evidence of recurrence. (Case 2.)

The pathologic report by Dr. Charles F. Geschickter, of Baltimore, follows:

"The section shows small round cells with malignant nuclei and practically no cytoplasm, growing diffusely and separated by strands of heavy fibrous tissue. Here and there the cells are compressed into spindle shape. The tissue resembles Ewing's endothelial myeloma. This would give it an origin from the ninth rib. The tumor could also be a pleural endothelioma, which cannot be distinguished microscopically from Ewing's sarcoma. However, I am placing it under endothelioma of the pleura because of the clinical history and the gross specimen."

This opinion was concurred in by Dr. Curtis Crump, Pathologist to Baltimore Hospital.

*Comment:* This rather unusual tumor was technically easy to remove. Grossly it was a definitely encapsulated and apparently benign tumor. Microscopically, it was malignant. Endothelioma

of the pleura is a rare tumor. Only time will tell whether the patient is cured.

#### SUMMARY

1. The occurrence of encapsulated intrathoracic new growths is not rare.
2. Many of these tumors are benign, but most of them are potentially malignant.
3. All of them should be removed as soon as diagnosed.
4. Two tumors, one ganglioneuroma and one endothelioma of the pleura, successfully removed by me, are reported in this paper.
5. Some of the technical problems connected with the surgical removal of intrathoracic new growths are discussed. Many of these problems have been overcome, and surgical removal of tumors of the chest is not a very hazardous procedure.

#### REFERENCES

1. Harrington, S. W.: Surgical Treatment of Intrathoracic Tumors and Tumors of the Chest Wall, *Arch. Surg.* 14: 406 (Jan.) 1927.
2. Harrington, S. W.: Surgical Treatment in Fourteen Cases of Mediastinal or Intrathoracic Perineural Fibroblastoma, *J. Thoracic Surg.* 4: 590 (Feb.) 1935.

---

NOTE: On May 5, 1936, the second patient returned with a nodule 2.5 cm. below the scar. This was removed, and examination shows it to be the same as the original tumor. Since then the patient has been given intensive roentgen-therapy. He has considerable pain in the operative area.

On roentgen ray examination, the lung fields are clear, but unquestionably, the patient has recurrence, and probably metastases.

He is still living on Aug. 15, 1936.



## TREATMENT OF ACUTE HEAD INJURIES

CHARLES O. BATES, M. D., F. A. C. S.

Greenville, S. C.

In considering the treatment of acute head injuries, one must realize the importance of the subject in the light of present day trauma. A comparison of the injuries received in the old "horse and buggy" days with those of the present time is astounding. Deaths from automobile accidents alone in 1920 were 11,061; in 1925, 19,610; 1930, 30,288; and 36,400 were killed during 1935. We are having a higher death rate on our highways than we had from the World War. There were 36,694 killed in the War and 13,691 died of wounds, a total of 50,385. The National Safety Council announced 99,000 accidental deaths for 1935. The majority of these traumatic deaths are due to injury directly or indirectly to the head or spine. Swift<sup>1</sup> states that there are approximately 112,000 cases of skull fractures annually in the United States.

We have seen a great change in the care of head injuries in the last twenty years. The medico-legal aspect of these cases has assumed considerable importance particularly in regard to keeping careful case records.

Let us first consider the less serious head injuries. Lacerated wounds of the scalp should all be treated as infected wounds. The wound should be loosely sutured and drained. In those cases where tight sutures are necessary to control hemorrhage the suture should be removed within forty-eight hours.

The stab wounds inflicted with such instruments as ice picks are becoming more common and are rather infrequently recognized. There is little external evidence of the small wound of entrance. The patient is frequently under the influence of alcohol, and we are perhaps prone to attribute his condition to intoxication. These wounds should always be considered as potentially dangerous. We have had cases in which the pick penetrated the brain with no evidence of paralysis or any manifestation of injury to the central nervous system. A number of cases have been reported from routine necropsies by the office of the Chief Medical Examiner<sup>2</sup> in New York City.

All wounds of the head where there is evidence of soil contamination should receive the prophylactic dose of tetanus antitoxin because tetanus following wounds of the head is more likely to be fatal.

Read before the Seventh Annual Assembly of The Southeastern Surgical Congress in New Orleans, March 9, 10 and 11, 1936.

A craniocerebral injury is the most serious injury of the head. It is in this type of injury that so much has been done in recent years by conservative treatment, and head injuries should be considered serious until proven otherwise. All patients with acute head injuries should be *quietly* admitted to the hospital, or in some cases, should be kept at a home near the scene of the accident. The less the patient is moved in the first twelve to twenty-four hours the better it is for him. We should not allow friends or meddlesome neighbors to cause us to subject our acutely traumatized head cases to an early unnecessary and sometimes valueless x-ray examination. This can be done at a later and safer time. A most important factor in the handling of these cases is the choice of a nurse. She should understand the psychology underlying the recovery from head trauma.

The control of visitors and family must be considered. They should not be allowed to discuss the patient's injury and possible future disability. Post-traumatic psychosis or hysteria is often produced by some suggestion implying permanent disability. Let us remember that an injury to the brain leaves for a time a sick mind capable of running the gamut of imagination.

Because of the various degrees of severity the treatment of craniocerebral injuries cannot be standardized. I believe that each case is a case unto itself.

In order to treat these cases properly, a bedside study of the patient should be made. More can be learned in the first few hours concerning the prognosis and after treatment of the patient than at any other time. It is in this period of five or six hours, that we must try to determine if there is an extradural hemorrhage, for many authorities believe extradural hemorrhage is the only indication for an early operation. An important point in the diagnosis of extradural hemorrhage is a lucid interval between the initial and subsequent loss of consciousness. The patient is at first unconscious or semiconscious, but later gets up, walks around, and then lapses into unconsciousness again. He has a dilated or fixed pupil on the same side as the hemorrhage. The patient may have paralysis beginning in the face and extending to the arm and possibly to the leg. Convulsions may also follow in the same order. Such a patient should have an immediate sub-temporal decompression and a ligation of the middle meningeal artery or some of its branches.

In craniocerebral injuries increased intracranial pressure is always due to hemorrhage or edema. There are varying degrees of brain trauma causing intracranial pressure<sup>3</sup>. Let us think of the head injury where there is no fracture demonstrable as a "black eye

of the brain." We have seen a slight blow cause minute petechial hemorrhages around the eye, and so the same condition in the brain gives the picture of concussion. The concussion cases usually clear up within a few hours or few days and the only treatment necessary is rest.

In the more severe cases the surgeon should determine how completely nature is compensating for the increased intracranial pressure. Space compensation is the principal function of the cerebrospinal fluid. We have seen large tumors removed from the brain where this physiologic compensation of cerebrospinal fluid had taken care of the patient as the tumor grew and did it so well that the patient was practically symptomless.

It is the duty of the physician to observe this degree of compensation, noting particularly the following:

1. The state of consciousness of the patient and this is most important of all data. The fact that the patient is unconscious means that the cerebrospinal fluid is not able to compensate for the pressure. The depth of the coma indicates the degree of seriousness of the patient's condition.

2. Restlessness is a symptom that might tempt one to give large doses of morphine. This would be the same as masking the symptoms in an acute abdominal emergency.

3. The pulse rate will remain slow and regular as long as the intracranial pressure is being compensated. A very slow pulse, around 40, or a pulse that is changing from 60 to 100 every few minutes means a losing battle for compensation.

4. The respiration remains slow and regular as long as there is compensation, but as compensation becomes broken the respiration becomes rapid, shallow, and irregular. Cheyne-Stokes respiration indicates marked intracranial pressure.

5. The change in temperature is a valuable guide. A rectal temperature should be taken every thirty minutes. When the temperature remains under 102, the pressure is being compensated—each degree above that means increasing danger.

It is in those patients with fracture of the skull and increased intracranial pressure that a most careful and persistent study should be made. The changes in the patient's condition appear so quickly and the time for favorable action is so short that the patient's life, in a measure, depends on the capability of the physician, and by this I do not mean necessarily that a specialist should be in atten-

dance, but a doctor who will give the patient his personal attention and act promptly upon his judgment.

The treatment of shock is the first consideration with few exceptions, and must be brought promptly under control. An emergency dressing must be applied to head wounds, but no wound repairs should be done that will further shock the patient. In some cases 50 c.c. of 50 per cent glucose solution may be given intravenously. Undoubtedly the most efficient treatment in acute craniocerebral injuries with or without increase in intracranial pressure is rest.

Those patients who show evidence of extradural hemorrhage with rapid increase in pressure should have immediate operation with ligation of bleeding vessels. This type of case represents a small per cent of the serious ones.

The cases of severe trauma to the brain with increasing intracranial pressure should be treated with rest, dehydration, lumbar puncture and decompression.

Rest means insuring a quiet room and a special selected nurse, with no unnecessary changing of clothes and baths. Under no circumstances should an x-ray of head be made while patient is still suffering from shock.

Dehydration can best be accomplished by limiting the intake of fluids to 600 c.c. in 24 hours, by administering hypertonic glucose solution, and giving magnesium sulphate. Fay<sup>4</sup> says: "When the pulse pressure approaches the pulse rate that is the time to dehydrate."

I do not believe in too early and too frequent use of lumbar puncture. It should never be used during the period of shock or to relieve pressure due to subdural or extradural hemorrhage. In those cases where rest and dehydration do not relieve the symptoms of increased intracranial pressure, lumbar puncture should be done. Its repetition should be determined by the results. Do it in those cases which in your judgment are apt to go on into medullary compression, and do not hesitate to drain 20 to 30 c.c. of spinal fluid at a time. It must be remembered the brain cannot long be subjected to pressure that interferes with cerebral circulation without causing cerebral degeneration or death.

Death is often due to pressure exerted upon the vital centers situated at the base of the brain in the region of the third ventricle, the medulla and pons.

The cerebral hemispheres and cerebellum are not so important in the continuation of life, but are quite important in the intelligent



reactions and post-traumatic behavior of the patient. It is in this region of the brain that prolonged pressure causes degenerative changes that are later manifested by psychic changes, loss of mental function and apparent paralysis and anesthesia. Damage to these centers of intelligence causes prolonged post-traumatic mental sequelae, a condition distressing to the patient and family, and often of serious economic significance.

Decompression is being less frequently employed—usually only for the specific purpose of removing some localized pressure, or for stopping hemorrhages. One indication for prompt surgery is a compound fracture of the skull where foreign bodies, fragment of bone, and hair may have been driven into the brain substance. Simple depressed fractures can be elevated under local anesthesia after a few days when the patient is out of danger.

#### SUMMARY

1. The rapid year by year increase in serious head injury cases is considered.
2. Their importance from a medico-legal aspect is noted.
3. The management of shock takes precedence over all other treatment.
4. The most efficient treatment is *rest*. A careful bedside observation for changes with prompt and appropriate treatment is necessary. Treatment cannot be standardized to suit all cases, but each case must be a case unto itself.
5. Increase in intracranial pressure must be controlled with the objective of lessening the likelihood of damage to the vital centers and consequent death, and to the cerebral hemispheres and cerebellum, thereby reducing post-traumatic sequelae and serious economic loss.
6. Conservatism in treatment is stressed.

#### REFERENCES

1. Swift, G. W.: Cerebrocranial Injuries; Review of 190 Cases, *West. J. Surg.* 40: 343-354 (July) 1932.
2. Helpern, Milton: Unusual Fatal Stab Wounds of Head and Neck, with Examples of Unrecognized Ice-Pick Wounds of the Brain, *Am. J. Surg.* 26: 53-63 (Oct.) 1934.
3. Mock, H.: Skull Fractures and Cerebral Injuries, *Internat. J. Med. & Surg.* 45: 1-13 (Jan.) 1931.
4. Temple, Fay: Treatment of Acute and Chronic Cases of Cerebral Trauma by Methods of Dehydration, *Ann. Surg.* 101: 76-132 (Jan.) 1935.

# A NEW METHOD AND END RESULTS IN THE TREATMENT OF CARCINOMA OF THE STOMACH AND RECTUM BY SURGICAL DIATHERMY

(Electrical Coagulation)

ALFRED A. STRAUSS, M. D.

SIEGFRIED F. STRAUSS, M. D.

HERMAN A. STRAUSS, M. D.

Chicago

In 1910 Kolischer introduced and advocated surgical diathermy for the removal of inoperable malignant tumors. In 1913 we employed this method for the removal of two cancers of the colon and three of the rectum in very old persons. The results were excellent. For a number of years we used surgical diathermy in cases in which operation was impossible—when the tumor was fixed, when the patient was very old (in the seventies) or when there was some other contraindication to a radical surgical procedure, such as disease of the heart or lungs. The results in these isolated cases were so satisfactory that for the past seven years we have used the procedure in practically all cases of cancer in the rectum up to the sigmoid colon which could be reached from below by the glass tube method, which we shall describe later.

In our previous publication<sup>1</sup> we reported the effect of surgical diathermy in coagulation of the rectum. We reported forty-two cases which we have treated by this method over a period of eight and one half years. Of these forty-two, twenty-one had no primary colostomies. In this series there were two deaths as an immediate result of the surgical diathermy and nine patients who died later from intercurrent diseases of old age, such as hemiplegia, embolism, etc.

Since that time we have added thirty-one cases to this list, with only one death. In only two did we perform a colostomy. Therefore in seventy-three patients there are fifty-two in which no colostomy was performed or necessary. In view of the fact that we have performed only two colostomies in the last thirty-one cases, we feel quite sure that in 6 to 10 per cent of the cases will a colostomy be necessary for surgical diathermy of the rectum. We have had no immediate mortality from this entire series of thirty-one cases, and

<sup>1</sup>Read before the Seventh Annual Assembly of The Southeastern Surgical Congress, in New Orleans, March 9, 10 and 11, 1936.

the results have been very similar to those previously reported; if anything more encouraging. The carcinomatous area in the rectum seems to disappear the same as before and following up all of these cases the results have been just as excellent as previously reported.

Instead of the glass tube we have modified this by an improved instrument (Fig. 1.), an unbreakable fiber tube which we have had made in various sizes, circumferences, length and shape. These seem to have added very much to the technic in our ability to coagulate these tumors in the rectum. We are more convinced than ever that the coagulation should be only fairly thorough the first time and more thorough the second and third times, if necessary. This

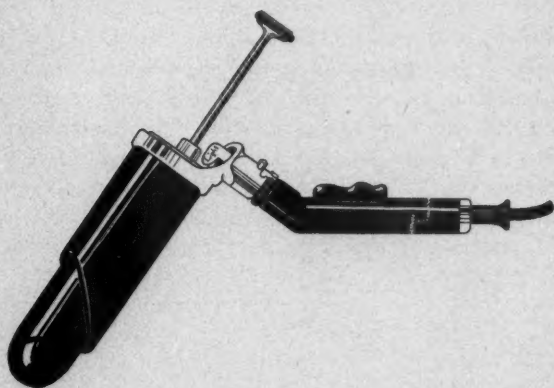


Fig. 1. Unbreakable fiber tube which is used in carcinoma of the rectum, and carcinoma of the stomach as a gastroscope.

is much safer and gives better results than one thorough coagulation at a primary setting. By doing this we get less scar formation, a better functioning rectum and much better results and fewer complications.

The reaction noticed on rectal examination after examining a large number of these cases is as follows:

Within a few days after the surgical diathermy one notices a large cavity where the tumor had been. The tissue in this area is soft and jelly-like in character and feels edematous to the sense of touch. There seems to be a hollow or concavity of the area diathermized, and the opening in the rectum is larger than normal. This edematous and jelly-like tissue gradually becomes absorbed and disappears about the second or third week, then the period of contraction comes on during which practically all of the carcinomatous tissue seems to be absorbed. The period of connective tissue

formation or replacement takes from four to ten weeks. There may be a beginning contraction of the lumen due to this connective tissue formation which begins from the fourth to the sixth week. From the tenth week on up to six months there is a good deal of absorption of this connective tissue and the lumen reestablishes itself to a considerable extent. At the end of this time there may be a fairly marked narrowing at the point of diathermy, especially if there was an annular carcinoma. The tissues seem to be very soft, however, and freely movable, and at the end of several months are very loose and so freely movable that one who had not seen the case previously would doubt if ever a carcinoma had been present. The narrowing of the lumen in the rectum varies greatly in various individuals. The reaction varies, first, by the amount of surgical diathermy applied; second, by the character of the carcinoma; and third, by the various reactions of the different individuals. In some cases there is very little or no contraction at all, while in others there is a great deal to the extent that resection of the scar has to be made in order to establish a good continuity of the rectum.

Finally, in examining these seventy-one cases, especially the older ones, the results at this time seem to be as excellent as the ones we reported a year ago.

Clinically, the results of the treatment are remarkable. After the first or second application of diathermy the patient gains weight, and the hemoglobin content and red cell count of the blood are increased to normal levels. Even a patient who has lost a great deal of weight or is cachectic loses all the appearances that are characteristic of a person with advanced carcinoma. The gain in weight shown by our patients has amounted to from 15 to 50 pounds (6.8 to 32.5 Kg.). This increase in weight, red cell count and hemoglobin content is not temporary. We have observed a number of patients from three to nine years, and they have retained their weight, color and healthy appearance.

In our earlier cases we gave the patient a series of blood transfusions, believing that the blood of young persons has a carcinolytic effect, but in order not to obscure the effect of the surgical diathermy we have not used blood transfusions in the last few years, except when one transfusion was necessary before operation on account of the poor general condition of the patient. We want to emphasize, therefore, that the improvement shown by these patients is not due to other therapy. All of the patients received diathermy alone—no treatment with radium or high voltage roentgen radiation and no liver therapy or other measures to increase the red cell count,



hemoglobin content or weight. Moreover, the improvement cannot be due to colostomy, which was performed on some of the patients, for twenty-two patients were not subjected to colostomy and they have gained as much weight and look as well as those on whom the operation was performed.

The argument may be brought forth that the patient gains weight because the primary carcinoma is destroyed and therefore there is no absorption of toxins from it. Against this theory is the fact that in many of the cases in which we used surgical diathermy the patient was well along in years and had a large mass which was fixed and practically inoperable, and there must have been metasta-



Fig. 2. Section of an excised scar in which no carcinoma cells are present.

ses at least along the lymph glands in the pelvis. In spite of this, some of the patients at the end of eight or nine years, and many at the end of three or four years, show no signs of metastases, loss of weight or cachexia.

In these previous reports we pointed out that electrical coagulation or surgical diathermy of the rectum is not purely a mechanical destruction of the cancerous tissue. By destroying it we liberate certain substances which are absorbed in the body in general. These substances evidently stimulate the reticulo-endothelial tissue and macrophages which not only limit and prevent further growth of the tumor, but also help to destroy it. In addition to that, it seems

to render the cancer cells inactive and to take away all those properties from the cell which make it malignant. It seems to affect regional lymph glands and to render the carcinoma cells in these regional lymph glands inactive.

It is apparent from the scars excised that a tremendous amount of connective tissue grows around these cancer cells. This, in all probability, plays a role in rendering these cells inactive.

In order to verify the above statements which are not merely theoretical, but based on our experience with these patients, we would like to bring out the following facts:

In a number of cases where we know that we did not destroy the entire tumor by coagulation, it completely disappeared and the tissue healed with very little scarification. It is also reasonable that in the many large carcinomas which we have destroyed in the rectum, there must be many areas that are not completely coagulated. It is quite reasonable to feel that in high-lying carcinomas, many of which we have coagulated, some area was overlooked, hard to get at, or difficult to see. Yet in all of these cases the tumor completely disappeared. This would tend to show that once the process is started, the substances liberated destroy or produce degeneration or absorption of the rest of the tumor, as this can be noted especially clinically in digital examination of the rectum where instead of the hard carcinomatous infiltrated area felt before that now after diathermy all the tissues are loose, movable and soft, and all infiltration seems to have disappeared. In a number of cases where we have excised a contracted scar in the rectum as a result of diathermy, which prevented the patient from having normal bowel movements, we found that this scar contained cancer cells which were degenerated and surrounded by tremendous masses of connective tissue. (Figs. 2 and 3, histologic sections.) It would seem that if these cells were active they would have produced recurrence of the tumor in its original position since these scars were excised from three to six years after the coagulation had been performed. Surely these cells must have been rendered inactive because no recurrence of the growth was encountered during these years. Only the scar itself was excised, and no other part of the rectum. We have followed some of these patients for several years after the excision of these scars. Some cancer cells surely were left behind in the tissue. We have to assume that they were rendered inactive because on examining these patients from a period of two to five years after the excision of the scar, no recurrence of any carcinoma or tumor formation can be noticed on proctoscopic or rectal digital examination. In several cases we did a laparotomy several years later on account

of urinary symptoms. We found nothing but a few small isolated lymph glands which on examination also revealed degenerated cancer cells. We therefore have to come to the conclusion that these degenerated cells in the regional lymph glands were rendered inactive by surgical diathermy for this number of years.

Of the large number of cases that we have reported, we have found no liver metastases. This was proved by a number of cases in which laparotomy was performed. While it is too early, and the series of cases is not large enough to make a definite statement about

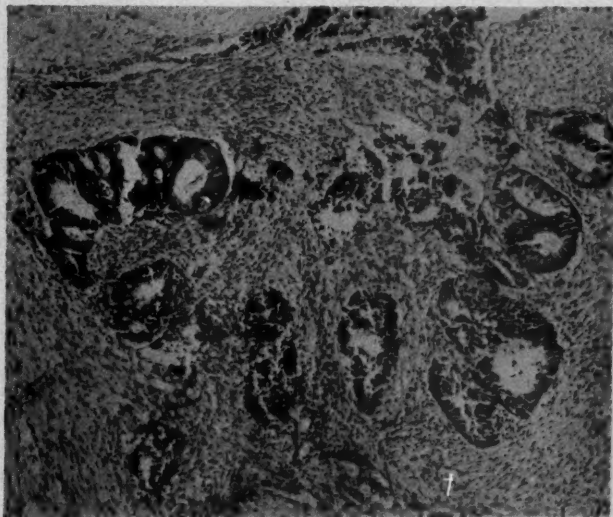


Fig. 3. Section of an excised scar showing dense scar tissue and carcinoma cells.

its inhibitory influence on the liver, yet it seems to us that that is probably a fact, although we will admit that it will take another five to ten years and a much larger series of cases to prove this point.

Having attained encouraging and somewhat brilliant results with surgical diathermy for carcinoma of the rectum, and having noted the complete disappearance of carcinoma in these cases for over eight and a half years, we felt that we should see if we could obtain similar effects and results in other parts of the intestinal tract. We therefore selected cases of inoperable carcinoma of the stomach for the next test in this procedure, which was carried out as follows:

We selected one case of carcinoma of the lower end of the esophagus which extended into the cardia of the stomach, and one case of cancer of the lesser curvature which involved part of the

cardia right up to the esophagus, and another case of carcinoma of the upper portion of the lesser curvature. Since these cases were inoperable from a surgical standpoint, and in view of our favorable experiences in treating carcinoma of the rectum, we felt justified in trying this procedure.

A Witzel jejunostomy was done for the purpose of feeding the patient. A midline incision was made from the ensiform cartilage to the umbilicus. The abdomen was opened. The stomach was

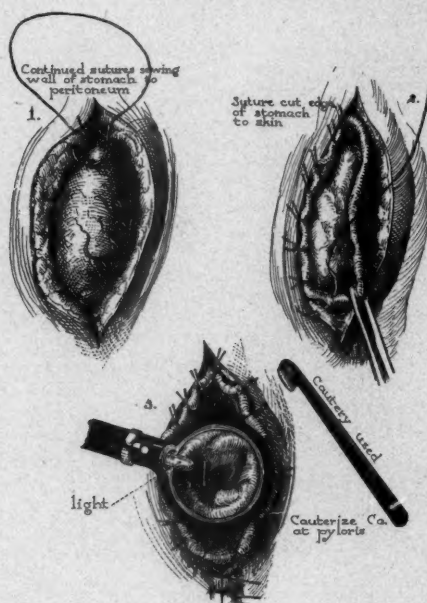


Fig. 4. The technic of suturing the stomach to the skin and the use of electrical coagulation.

freed from the surrounding tissue, and the anterior wall was brought out as far as possible and sutured to the skin with interrupted sutures of silk (not to the abdominal wall) (Fig. 4<sup>1</sup>). A longitudinal incision was made in the anterior wall midway between the greater and lesser curvature in the most bloodless portion of the stomach for about 4 inches, and the bleeding vessels were ligated. A specially constructed gastroscope made of wood fiber similar to the ones used previously in our coagulation of cancer of the rectum was placed into the stomach (Fig. 4<sup>2</sup>), to expose the cancer along the lesser curvature up to the esophagus. A very light and mild surgical diathermy was then performed over the entire area of the carcinoma of the stomach. This mild coagulation was



done with the idea of producing a mild reaction around the stomach and surrounding area so as to wall off the stomach by this reaction. Then ten days later we gave a more severe and thorough diathermy

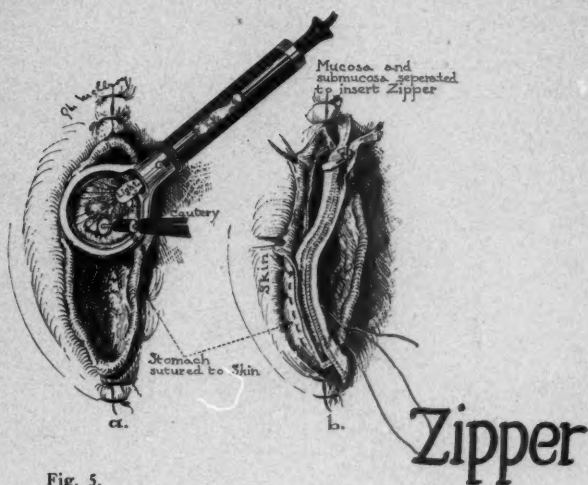
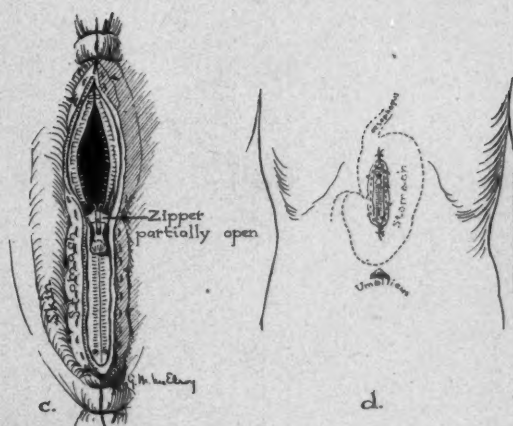


Fig. 5.



# Zipper

Fig. 6.

to all the cancer tissue, feeling safe in penetrating the stomach wall more deeply. The patient had very little reaction from this procedure, and we could see with the open stomach just exactly what was happening. An ordinary metal zipper such as used on purses

and dresses was sutured with continuous silk sutures between the mucosa and muscularis along the edge of the stomach (Fig. 5, a and b) after the mucosa and muscularis were separated. When both sides were sutured in, it permitted the opening or closing of the cut end of the stomach (Fig. 6, c and d). It has the advantage of opening the stomach at will for inspection or doing a second or third diathermy. This zipper seems to stay in place for about two weeks, varying in different individuals depending upon the amount of tension with which it is sutured.

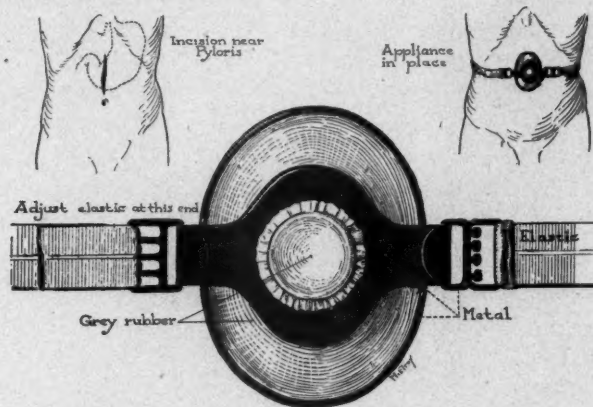


Fig. 7. Rubber patch.

We have also tried a rubber patch which was attached to the skin by a latex rubber paste as shown in Fig. 7, in place of the zipper. It is difficult to say which in the final analysis will prove to be the most practical. This prevented the gastric juice and food from escaping, and prevented irritation of the gastric juice on the skin and allowed the patient to eat normally rather than being fed through a jejunostomy. This helped to preserve his body weight. The appearance of the diathermized carcinoma was pale and grey, and gradually became absorbed with very little or no sloughing, and substituted by healthy looking granulation tissue, and finally thin layers of mucosa grew over these areas.

The opening in the stomach was large enough so one could easily insert three fingers and feel very carefully the tissues which had been destroyed by coagulation. Instead of feeling hard like carcinoma, they felt soft and pliable, and the masses had completely disappeared. The last examination was made two months after coagulation, and before the stomach was closed the tissues felt

smooth and soft and there was no bleeding on handling them with the gloved hand. The opening in the anterior wall of the stomach was closed in the usual manner with three layers of catgut and an outer layer of interrupted silk.

Some of the knowledge that we have gained and come of the difficulties we have experienced in these cases is as follows:

It is best to do the coagulation within a period of three to six weeks, say three coagulations about eight to ten days apart. All this time the patient of course is fed a high caloric diet through the jejunostomy. We did a case similar to this for carcinoma of the esophagus in which the lesion was one inch above the cardiac sphincter, with the exact procedure, (Fig. 8). At the end of six weeks we passed some graduated sounds into the esophagus to

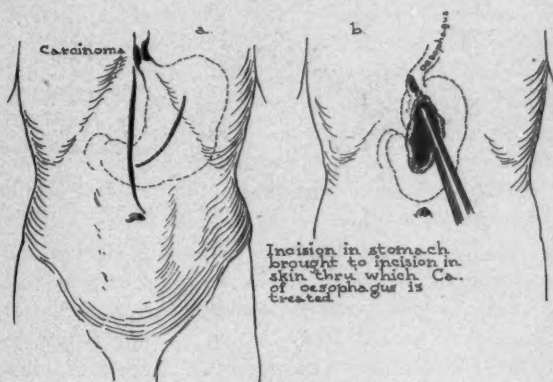


Fig. 8. Carcinoma of the esophagus.

measure the opening. We were able to pass the largest sounds without the slightest difficulty without any bleeding, and upon making a digital examination through the opening of the stomach, passed the finger up into the esophagus. Everything was smooth and soft, and the carcinomatous area seemed to have completely disappeared. The patient's stomach is now closed and she is taking all kinds of food.

A third patient with carcinoma in the upper third of the lesser curvature was operated upon with the same procedure and the same results.

We conclude that while it is too early to make any positive statements as to whether the clinical end results of carcinoma of the stomach will be as good as those for carcinoma of the rectum,

it remains to be seen, and only time will tell after a large series of cases have been reported within a period of five to ten years. The only comment that we can make is that the procedure seems quite feasible, and the results look very promising and surpass any method of handling these cases in which surgery, x-ray and radium have been of no avail whatsoever.

Clinically, these patients aside from the loss of weight because they are not using the stomach, seem to have very little reaction from the surgical coagulation, in fact much less than those of the rectum. Our impression at present is that very large and extensive carcinomas of the cardia and high lesser curvature which are inoperable can be coagulated by surgical diathermy with a very small immediate mortality.

*Pathology:* One of the patients who was extremely cachectic, although his stomach was in excellent shape, developed a terminal pneumonia and died four months after the procedure was finished. Autopsy revealed a stomach which was perfectly soft and normal in appearance, adherent to the posterior wall of the contiguous organs such as the liver, pancreas, mesocolon and peritoneal surfaces. On opening the stomach on its anterior wall we could see a perfectly smooth wall where the carcinoma had been. There were no fungating growths. The portion of the stomach which was coagulated was somewhat thinner in its wall, perfectly smooth, pliable and soft, and was covered by a very fine thin layer of mucosa. The whole area seemed to be depressed from the rest of the stomach like a flat healed ulcer, which was probably due to the absence of the full thickness of the normal mucous lining of the stomach, the mucosa. Here and there was an isolated nodule remaining that probably was carcinoma, but these seem to be inactive, very similar to the islands that we see in the rectum. From this gross specimen we would say that the reactions and the end results produced by the surgical coagulation of the stomach are very similar and look as favorable as those of the rectum.

*Histology:* The sections of the stomach in the region diathermized show a tremendous amount of increased connective tissue. The cells themselves are pale, in most of them the nuclei have completely disappeared, and no mitotic figures can be seen. They are surrounded by a tremendous amount of connective tissue, in many areas several cells are isolated by a large amount of connective tissue. Other sections that were taken from ten to twelve days after surgical diathermy of the stomach show a tremendous invasion of the so-called macrophages of the reticulo-endothelial tissue. It would seem therefore that the tissue reactions and the histologic



picture following surgical diathermy of the stomach show practically the same picture that those histologic sections of the rectum have shown following this procedure, namely the cancer cells have lost their malignant properties, look somewhat degenerated in their cytoplasm and nuclei, and are surrounded by a tremendous amount of connective tissue. In some areas the stomach wall seems so thin that it encroaches on the wall of some of the larger blood vessels, such as the larger artery of the celiac axis, and one can very readily see the possibility of erosion into one of the large blood vessels, even the abdominal aorta or vena cava.

#### CONCLUSIONS

1. Surgical diathermy is not purely a mechanical destruction of the cancer.
2. Definite substances are produced by the coagulation of the tumor which are liberated and which render the cell inactive as far as those peculiarities which it has that characterize it as a malignant cell. This probably is due to the stimulation of the reticulo-endothelial tissue and cells, the macrophages.
3. It has similar effects on the regional lymph glands and probably the liver.
4. The destruction of the carcinoma of the stomach seems to have in general the same reaction as those of the rectum, and also seem to render the cancer tissue inactive as to its malignant peculiarities.

#### REFERENCE

1. Strauss, A. A.; Strauss, S. F.; Crawford, R. A., and Strauss, H. A.: Surgical Diathermy of Carcinoma of the Rectum: Its Clinical End Results, *J. A. M. A.* 104: 1480-1484 (April 27) 1935.

## FRACTURES OF THE PATELLA

RICHARD T. HUDSON, M. D., F. A. C. S.

Louisville

**I**N order to explain more perfectly the mechanism of injury and repair of the patella, I shall briefly describe the anatomy.

The patella may be thought of as a triangular, sesamoid bone in the extensor tendon of the knee. Its purpose is to afford protection to the front of the joint and increase the leverage of the tendon. The patella is composed of a uniform, dense, cancellous tissue which explains why little if any callus forms, and why bony union is so frequently delayed.

However, good fibrous union is compatible with excellent function. Some authorities say that the patella, being a sesamoid bone, is devoid of true periosteum. To the superior border is attached the quadriceps femoris tendon, composed of the rectus femoris and vastus intermedius in the center and the vasti lateralis and medialis on either side.

The ligamentum patellae, or the patellar tendon, is attached to the inferior border of the patella and extends down to the tibial tubercle. The patella is really a bony link in this tendinous chain.

The patella is ossified from a single center, which appears at the second or third year, but ossification is not complete until puberty. Consequently, fractures of the patella are rare under 15 years of age.

Rarely there may be two centers of ossification. These result in patella biparta, which may be confused with fracture in injury cases. Usually this is a bilateral condition so that an x-ray of both knees will establish the diagnosis.

Kellogg Speed<sup>1</sup> states that more than twice as many cases of fracture of the patella are found in men as in women; most instances occur in the fourth decade of life; very few are open fractures.

There are two causes of fracture of the patella:

1. Direct violence, as a blow or fall on the patella—As Scudder<sup>2</sup> says a "blow fracture".

2. Indirect violence from forcible contraction of the quadriceps femoris muscle—"tear fracture". This occurs with the knee in semiflexion and only the upper portion of the patella is in contact with the femur, while the lower half is unsupported. The lower end is fixed by the patellar tendon providing a fulcrum at the point of contact.

Read before the Louisville Surgical Society, Feb. 7, 1936.

The fractures by direct violence are more common and frequently result today from automobile collisions by bumping the passenger's knee against the cowl or instrument board while the knee is flexed and the thigh muscles are tense. The right patella is more frequently fractured than the left.

The most common type of fracture is the transverse one, though comminuted and stellate fractures are not unusual and occasionally the bone may be split longitudinally.

The amount of displacement of the fragments is dependent upon the extent of the tear in the fibro-aponeurotic investment and the lateral expansions of the extensor tendon.

It should be borne in mind that the tearing of the tendon is the most important part of the injury and is in itself reason enough to warrant open operation and suture.

The usual symptoms are pain and inability to extend the knee. Many times one can see and feel the separation between the fragments. The joint soon fills with blood, from the tear in the tendinous and capsular structures. X-ray films of both knees should be made to determine the exact nature and extent of the fracture.

#### TREATMENT

The treatment is entirely dependent upon the extent of the injury. If there is only a fissure or chip fracture all that is necessary is immobilization for from four to six weeks, followed by a removable cast or brace so that physical therapy and muscle exercise may be carried out. This conservative method of treatment may also be used in the very old patient, or where there is extensive damage to the soft tissues in which open operation is contraindicated. On the whole, the period of disability is longer than with open operation and the end result is more uncertain and a second fracture more likely to occur.

Wilson and Cochrane<sup>3</sup> state, however, that the lateral expansions undergo vicarious development and replace the ruptured tendon to a large extent. In fractures with wide displacement and marked hemorrhage into the knee joint, open operation is certainly indicated.

I do not feel that it is necessary to delay operation, unless there are abrasions or lacerations of the skin. In this case the wound is treated by antiseptic dressings for from eight to ten days.

There are many good types of operation and a number of suture materials have been described.

The following is the technic I have used often and found entirely satisfactory:

The skin is prepared the day before operation by shaving carefully, cleansing with green-soap and ether and a sterile alcohol dressing applied. This dressing is kept moist with alcohol until the time of operation. The operation is performed under general or spinal anesthesia. The blood is stripped from the leg, by elastic webbing, beginning at the toes and going to the upper third of the thigh. A broad elastic tourniquet is then applied in the upper third of the thigh and the webbing removed.

The skin is opened by a straight longitudinal or better a curved incision with convex side toward the foot and the base pointing upward. The skin and superficial fascia are dissected off the patella and the wound made sufficiently large to expose the lateral expansions of the extensor tendon and the capsule.

There are usually many large blood clots and a large amount of old blood in the joint which are removed by irrigating with a half gallon of warm, normal saline, while the joint is passively flexed and extended. It is important to remove all the clots, for if they are left, they promote the formation of adhesions.

The irregular, torn, shredded ends of the tendon lying between the fragments are trimmed away.

Two or three small holes are then drilled in each of the fragments, so placed that they enter through the anterior surface of the bone and emerge external to the articular surface. This is done so that sutures passing through the holes lie outside the capsule or articular surface of the knee joint. I have usually used No. 2 chromic catgut doubled for this, but kangaroo tendon acts equally well.

The torn lateral expansions of the tendon are then carefully sutured with interrupted sutures of No. 2 chromic catgut. A purse string suture around the whole patella, of doubled No. 2 chromic catgut is sometimes taken, but care must be taken not to draw it too tightly, or necrosis and serious loss of tissue may result. The skin is closed with a continuous stitch of No. 1 plain catgut or dermal as the operator may desire. A plaster cast is then applied from the ankle to the upper third of the thigh with the knee in full extension.

The patient is returned to bed and the leg either suspended from a frame or placed on pillows. Two ice caps are placed on the knee to lessen hemorrhage and swelling. The cast is bi-valved at the end of ten to twelve days, the wound dressed and light massage of the anterior thigh muscles begun.



After three weeks passive movements are begun followed a week later by light active movements, the well leg assisting the injured one. The physical therapy consisting of heat, massage and muscle exercises, is given daily or every other day till the end of eight weeks.

The cast is entirely removed at this time and the patient allowed to go without any support, but it usually requires twelve to sixteen weeks before the patient can return to his usual occupation and this time may even be extended in compensation cases.

Naughton Dunn<sup>4</sup> advises that a tension suture, consisting of pliable phosphor-bronze wire be passed in a sinuous course through the quadriceps tendon and tied over a piece of gauze externally. This is cut and removed after two or three weeks.

I believe that compound fractures are best treated by thorough debridement, copious irrigations of warm, normal saline and primary repair of the fracture as described above in simple cases.

If no infection develops we know that the fracture has been adequately cared for, and if infection develops, one can easily reopen the wound and irrigate the joint and apply antiseptic dressings. The combined serum to protect against both *B. tetanus* and *B. Welchii* is given routinely.

In the operative repair of simple fractures fascia lata is advocated by several authorities and offers the advantage of earlier motion and the fact that we have a living suture to strengthen the quadriceps tendon.

Phemister<sup>5</sup> in 1915 advocated this method in old fractures of the patella, and Gallie and Le Mesurier<sup>6</sup> in 1921 had excellent results with this material. Allen<sup>7</sup>, of the Fracture Service of the Massachusetts General Hospital, in an excellent article reported fifty cases, many having this type of operation, with very satisfactory results.

The fascia is removed from the opposite thigh, so that early motion of the fractured patella may be started. The fascia may be used as narrow strips through holes bored in the fragments or as a broad plaque to reinforce the lateral expanses of the tendon.

#### SUMMARY

1. Fractures of the patella constitute a major injury and will lead to marked disability unless properly treated.
2. The treatment is always operative in cases where the fragments are widely separated and there is extensive laceration of the tendon.

3. Only absorbable suture material or fascia has been found to give satisfactory results in the hands of most orthopedic surgeons.
4. The after-care is a very important part of the treatment.

## REFERENCES

1. Speed, Kellog: *Fractures and Dislocations*, ed. 3, p. 770. Philadelphia: Lea & Febiger, 1935.
2. Scudder, Chas. L.: *The Treatment of Fractures*, ed. 10, p. 622. Philadelphia and London: W. B. Saunders Company, 1926.
3. Wilson, P. D., and Cochrane, W. A.: *Fractures and Dislocations*, ed. 2, p. 603. Philadelphia and London: J. B. Lippincott Company, 1928.
4. Dunn, Naughton: Observations on Some Injuries of the Knee-Joint, *Lancet*, 1: 1267-1274 (June 16) 1934.
5. Phemister, D. B.: Fascia Transplantation in the Treatment of Old Fractures of the Patella, *Ann. Surg.* 62: 746 (Dec.) 1915.
6. Gallie, W. E., and Le Mesurier, A. B.: The Use of Living Sutures in Operative Surgery, *Canad. M. A. J.* 11: 504 (July) 1921.
7. Allen, A. W.: Fractures of Patella, *J. Bone & Joint Surg.* 16: 640-648 (July) 1934.

## THE RESULTS OF SUPERIOR CERVICAL SYMPATHECTOMY IN ANGINA PECTORIS

HARRY HYLAND KERR, M. D., C. M.

Washington, D. C.

IT is now twenty years since surgery was first used in the treatment of angina pectoris. In that time a great deal has been added to our knowledge of the disease itself and its differentiation from coronary thrombosis and other cardiopathies. Much work has been done on the physiology of the heart and the heart muscle. Careful studies of the cardiac nerve supply, especially of the sympathetic pathways to and from the heart, have been recorded. Anatomists are pretty well agreed as to the distribution of the pre-ganglionic and post-ganglionic fibers of the autonomic nervous system to the cardiac plexuses.

The original method of surgical attack has also been varied considerably. In 1916, Jonnesco removed all of the cervical sympathetic ganglions on the left side in a case of angina pectoris following the suggestion made by Francois Franck in 1899. Good results followed this operation, but it was a formidable procedure to carry out in elderly people with damaged circulatory systems. In 1923, Coffey and Brown discovered that the simpler operation of superior cervical ganglionectomy brought equally satisfactory results.

In 1925, alcoholic injection of the thoracic ganglions as a means of interrupting the sympathetic nerve supply to the heart was reported by Mandl. If successful, and, I may add, it is a difficult procedure, injection relieves the pain of angina pectoris, but often substitutes the pain of intercostal neuralgia.

In 1933, Blumgart and his co-workers reported their results of treating angina pectoris and cardiac failure by total thyroidectomy. This announcement revived the interest of surgeons in the operative treatment of angina pectoris, and was followed by numerous contributions discussing thyroidectomy and other forms of surgical treatment of this disease.

With this renewed interest in the surgical attack it would seem timely to report the ultimate results of each form of therapy so that its true value might be determined. Since 1924, I have done superior cervical sympathectomies in a small series of private cases that have been carefully studied and carefully followed. Each patient was referred to a competent cardiologist who made the

diagnosis and advised surgical treatment. All have been operated on by me, all have been traced, and many of them re-examined from time to time.

Anatomic and physiologic studies of the cardiac nerve supply would seem to justify superior cervical ganglionectomy as a means of affecting the sympathetic control of the base of the aorta and coronaries.

The heart is supplied by the two vagus nerves and the sympathetic cardiac plexuses.

The cardiac plexuses are two: the anterior or superficial, and the posterior or deep. The anterior plexus supplies the greater part of the circumference of the base of the aorta, and the anterior or left coronary artery. In a most recent contribution on the essential anatomy of the autonomic nervous system, Kuntz states: "the sympathetic innervation of the heart is derived from the superior, middle, and inferior sympathetic cardiac nerves," and "cardiac nerves arising from the thoracic segments of the sympathetic trunks." It is true that fibers can be traced from the thoracic ganglions to the cardiac plexuses, but they are not to be compared to the three cardiac nerves as to size and regularity. Of the three cardiac nerves, the superior which arises from the superior ganglion is the largest and most regular in origin and distribution. The superior cardiac nerve arises from the anterior border of the superior ganglion near the lower end, and passes downwards and forwards to its distribution to the anterior cardiac plexus between the aorta and the right pulmonary artery. To quote Kuntz again, "the thoracic cardiac nerves, like the middle and inferior cervical, include both sympathetic and visceral afferent fibers. *The superior cervical sympathetic cardiac nerve probably includes no afferent components.*"

In view of this authoritative statement any effect that ablation of the superior cervical ganglion has upon cardiac pain must be due to its effect on the cause of the pain and cannot be due to the severance of the pain pathways. Such would be a reasonable explanation of the relief afforded if we consider the superior cervical ganglions as the principal sympathetic supply to the aorta and the anterior coronary artery to the left heart.

Most authorities now consider anoxemia of the cardiac muscle from inefficiency or spasm of the coronaries as the cause of angina pectoris. When the cardiac circulation is enhanced by dilatation of the coronaries (as with the nitrites) the attacks of pain are arrested. Interruption of the principal sympathetic control of the cardiac circulation should therefore be expected to prevent or materially to lessen arterial spasm of that circulation and enhance the



blood supply to the cardiac muscle. The superior cardiac nerve from the superior cervical ganglion, made up of *efferent* fibers alone according to Kuntz, must carry most of the sympathetic control of the important left heart and aorta.

The effects of the division of the sympathetic supply to portions of the arterial tree elsewhere in the body are well known. The pain and arterial spasm in Raynaud's disease are relieved by sympathetic ganglionectomy, and likewise, the pain and ischemia of Buerger's disease. Not only is arterial spasm controlled by ganglionectomy, but the circulation is definitely improved. We must remember, however, that we are treating a symptom and not the underlying disease. The basic pathology, be it in the aorta, coronaries, or in the myocardium, is not directly attacked by our surgical procedure.

I am reporting thirty cases of angina pectoris treated by superior cervical ganglionectomy. In eighteen cases only the left superior cervical ganglion was removed because the pain was confined to the left side in these cases. In eleven a bilateral superior cervical ganglionectomy was done as the pain was referred to both sides. In one case the distribution of pain was to the right side alone, and in this case only the right superior cervical ganglion was ablated.

#### CASE REPORTS

CASE 1. 1924, A. F. W., a 57 year old woman, had had anginal attacks for 20 months, increasing in severity until she was confined to her room. Her general physical examination was negative. Following bilateral ganglionectomy she obtained complete relief and returned to her former occupation. She died 6 years later in Spain from an unknown cause.

CASE 2. 1924, W. E. P., a very stout man of 54, had a systolic blood pressure of 200, with an enlarged heart. Typical anginal attacks had appeared a month before. The pain was limited to the left side. Following left superior cervical ganglionectomy he obtained complete relief. Death occurred 4 years after operation of congestive heart failure.

CASE 3. 1924, R. M. H., a 60 year old man, had had attacks of pain for 6 months. His general condition was good. Complete relief was obtained from sympathectomy. Although he developed a right hemiplegia with aphasia 6 months after operation, he lived without recurrence of angina for 8 years when he died of pneumonia.

CASE 4. 1924, E. B. P., a man of 55 in very poor general condition, had had bilateral pain for a period of 2 months. Marked cardiac enlargement, congestive failure with generalized anasarca and a systolic blood pressure of 150 were present. Both superior cervical ganglia were removed with very little relief. Three weeks later the balance of the left sympathetic chain with the stellate ganglion were removed from in front. On the whole he obtained about 25 per cent relief, but died from heart disease 3 months after operation.

CASE 5. 1925, C. F., a man 61 years old, was totally incapacitated from a progressive angina of  $3\frac{1}{2}$  years duration. His general physical condition was good and the heart showed no abnormalities clinically. Following a left superior cervical ganglionectomy he obtained at least 75 per cent relief, and was able to return to his full occupation which necessitated climbing stairs and other fairly strenuous exertion. Three years following operation he suffered a typical coronary thrombosis from which he recovered, and later went through an attack of pneumonia. He died 9 years and 8 months after operation from a renal disorder.

CASE 6. 1925, T. E. M., a man, aged 52, had had several typical attacks of angina during the previous 2 months. His general condition was good. He obtained complete relief from superior cervical ganglionectomy. He has had two attacks of coronary thrombosis since operation, according to his physician, Dr. J. P. Clark, Lynchburg, Va. He has resumed his former occupation and is still living, free from pain, 9 years and 9 months after operation.

CASE 7. 1925, G. D., a woman of 57, had had typical attacks of anginal pain for 7 years. She was rather obese and her systolic blood pressure was 230. She was confined to bed. X-ray showed a broad aortic arch and electrocardiographic studies revealed definite myocardial damage. She obtained complete relief from ganglionectomy and returned to work attending store and climbing stairs. Six years after operation she died from hypertension.

CASE 8. 1925, F. S., a 50 year old woman, had had angina for one year. Her general condition was good, although a diagnosis of aortitis had been made. She obtained complete relief following operation and returned to her former mode of life. She died from an unknown cause 6 years after operation.

CASE 9. 1925, O. D., a man 43 years of age, had experienced only two typical attacks of angina, the first 6 months before operation. His general condition was only fair, the pulse was irregular and the systolic blood pressure was under 100. Complete relief followed operation and he returned to his former occupation. He would not obey instructions to take life at a slower pace and continued drinking, injudicious eating and late hours, until he died suddenly 5 months after operation.

CASE 10. 1925, W. I. L., a 51 year old woman, had suffered with bilateral angina for 4 years. Her general condition was fair. Mitral stenosis was present and her systolic pressure was 212. She obtained nearly complete relief from operation and returned to her former activities. Five years later she died from an unknown cause.

CASE 11. 1925, N. L. C., a man 64 years old, had had bilateral anginal pain for 4 months. His general condition was good and examination showed no evidence of aortitis. Following bilateral sympathectomy he obtained about 25 per cent relief but was never able to resume his former activity. Two years and five months later, immediately following a sudden, severe headache, he dropped dead. There was no complaint of cardiac pain at the time.

CASE 12. 1926, L. E. W., a man 60 years of age, had a two year history of angina. His general condition was only fair. Systolic blood pressure was 200. He obtained only 75 per cent relief: he was able to be up and about, but never able to return to his former activity. He died 1 year and 10 months after operation of what his physician diagnosed coronary occlusion.

CASE 13. 1926, R. A., aged 61, for 2 years had suffered progressively worse attacks of pain until his condition was desperate. He had lost 25 pounds and examination showed aortic regurgitation, marked arteriosclerosis and marked cardiac dilatation. After 4 weeks in bed suffering severe pain only slightly relieved by nitroglycerin, he was admitted to the hospital for operation. I found him sitting up in bed groaning with intense pain in the right chest and arm. Three-eighths grain of morphine had no effect, nor did another fourth while on the operating table. At the moment the attachments of the ganglion were severed his pain ceased. He returned to his room elated over the relief of pain, but one half hour later he died suddenly.

Partial autopsy revealed atheromatous aortitis, incompetent valves and myocarditis. The most striking finding, however, was the extreme sclerosis of the coronary arteries. They were not thrombosed.

CASE 14. 1926, J. J. Q., a man 47 years of age, had had mild attacks of angina for 5 years. A recent one had been quite severe. His general condition was good. He obtained complete relief from ganglionectomy, gained 40 pounds, and returned to his full occupation from which he had been partially disabled. Eight years after operation he recovered from an attack of coronary thrombosis and 13 months later died a cardiac death.

CASE 15. 1926, C. H., a 54 year old man, had been incapacitated from attacks of angina for 3 months. His general condition was good except for a systolic blood pressure of 160 and a high non-protein nitrogen. He obtained 75 per cent relief following operation. There was immediate paralysis of the left vocal cord following operation; a typical Horner's syndrome appeared at the same time. He recovered his voice in about 9 months and was able to resume his former occupation. He died from heart failure five years after operation.

CASE 16. 1926, M. V. B., a woman 64 years of age, had suffered with angina for 6 months and had been confined to her room the last month. Her general condition was thought to be good although she ran a fast pulse. Complete relief followed ganglionectomy. After returning to her home congestive failure set in and she died 18 days after operation.

CASE 17. 1926, L. S., a woman 67 years of age, had had typical right sided attacks of angina for 3 or 4 years. She also had an enlarged heart, with aortitis and a left ventricular preponderance. The blood pressure was 175/90. She obtained practically complete relief following ganglionectomy, although on two occasions after undue exertion she had pain in the right arm, but without retrosternal discomfort. She returned to full duties as a housekeeper, but died of heart failure 2 years and 1 month after operation.

CASE 18. 1928, O. A., a man 70 years old, had had light attacks of bilateral pain for 4 years. Recently the attacks had become more severe, and he had been completely disabled. He was reported to have had two attacks of coronary thrombosis by Dr. Luther Davis of Fairmont, W. Va. His general condition was good for a man of his age. The blood pressure was 193/100 with some damage to his myocardium. He obtained complete relief from operation. Five months later he developed diabetes and died 2 years and 7 months after operation.

CASE 19. 1928, A. F., aged 55, had had bilateral pain of one year's duration. His general condition was good and the heart examination was negative.

He obtained nearly complete relief after operation and returned to duty as a patrolman. He died several years later of unknown cause.

CASE 20. 1928, A. H. F., 62 year old man with diabetes, had had bilateral pain for 3 months. His ordinary weight was 230 pounds, but at operation he weighed only 194. Prostatectomy had been performed 6 years before. He obtained almost complete relief following ganglionectomy, but died suddenly 13 months later of unknown cause.

CASE 21. 1928, a 60 year old man, had had mild attacks of pain for 10 years, but recently two very severe attacks had completely disabled him. He was impatient of his disability and demanded relief. The cardiac examination was negative, and his general physical condition was fair. Left ganglionectomy afforded some relief, but he demanded more; one week later the stellate ganglion was removed posteriorly. During a stormy convalescence he was very restless, irrational, sleepless and had hallucinations. He was confined to an institution for a short time, but gradually improved, and was able to return to his former occupation as a patent attorney. He obtained about 75 per cent relief. He now works full time, but cannot exert himself unduly and has to take nitroglycerin occasionally. He is in fair condition 7 years and 2 months after operation.

CASE 22. 1929, M. R., a 60 year old man, had had light attacks of pain for 10 years, but had been incapacitated by severe attacks for the last 9 months. General condition was fair. Operation brought about 75 per cent relief. He was able to return to a full life and was alive and well when last heard from 5 years and 5 months after operation.

CASE 23. 1929, O. B. B., a man 67 years of age, had had mild attacks of pain for 4 years, with several severe attacks lately. The general condition was fair. Systolic blood pressure was 160. He obtained about 50 per cent relief from operation. An attempt 6 months later to inject the thoracic ganglions caused such severe pain that it had to be discontinued. He is now living a fairly active life 6 years and 7 months after operation.

CASE 24. 1930, E. C., a 70 year old woman, was totally incapacitated with severe attacks of pain. Her general condition was fair. There were no gross pathologic changes of the heart. She obtained about 25 per cent relief from operation. The family physician reported her death from angina 14 months after operation.

CASE 25. 1931, B. H. H., a woman of 60, had had bilateral pain for 4 months. Heart examination revealed some aortitis, but otherwise was negative. She had a right sided vocal paralysis following operation from which she recovered in 6 months, but obtained complete relief following bilateral sympathectomy. She is now living and well, 4 years and 10 months after operation.

CASE 26. 1933, H. N., 60 years of age, had had attacks of pain for 6 months. He was a diabetic with some aortitis, and had a history of syphilis, although the blood Wassermann was reported negative. Operation brought nearly complete relief. His physician, Dr. J. F. Lynch, Elmira, N. Y., reports: "—works steadily; has not been disabled, and seldom complains of any distress." It is now nearly 3 years and 2 months since operation.

CASE 27. 1934, C. B., aged 56, complained of bilateral pain of one year's duration. Lately the attacks had become much more severe, and began to occur at night. He was confined to his room completely incapacitated. His



general condition was fair, the heart examination was negative and the systolic blood pressure 155. Bilateral sympathectomy brought complete relief. He has returned to his former occupation of printer. He reported to the office in good condition within the month, now 2 years after operation.

CASE 28. 1934, C. W., a 50 year old woman, had suffered with bilateral pain for 2 years. The general condition was very poor. She was a fat, flabby individual with hypertension. She had had an attack of coronary thrombosis at the beginning of her illness. Operation brought about 75 per cent relief. She is now living a fairly active life with occasional doses of nitroglycerin nearly 2 years after operation.

CASE 29. 1934, W. F. K., a woman 60 years of age, gave a 2 year history of bilateral pain. She was bed-ridden because of the severity of her attacks. The heart was reported negative, but when I first saw her at her home she had the most severe attack of angina I have ever witnessed. I thought she would succumb. Operation brought complete relief. She returned to a fairly active life, but died about one year after operation from cerebral hemorrhage.

CASE 30. 1935, S. L., a 73 year old woman, had been having attacks of pain for years. She was in very poor condition with some signs of congestive failure. The blood pressure was 185/100. The electrocardiogram showed evidences of myocardial disease. There was some pretibial edema. The amount of relief from operation was indeterminate because pulmonary edema and anasarca developed and she died five days after operation. No autopsy was permitted.

#### SUMMARY

Of the thirty patients, two died while in the hospital, one immediately after operation, and one five days postoperatively.

In the remaining twenty-eight cases, complete relief was obtained in fourteen. By complete relief is meant complete cessation of attacks of pain following exertion, eating, or excitement; stimuli that had previously produced characteristic attacks.

Of the remaining fourteen cases, ten obtained 75 per cent relief. In these cases, a lesser degree of pain in the precordium was caused by exertion, eating, or excitement. An occasional dose of nitroglycerin was taken, but they were able to resume their previous life or occupation at a lesser tempo.

Only slight relief, estimated at 25 per cent, resulted from operation in three cases. Former stimuli continued to produce pain of a lesser degree, but they were unable to return to work, and had occasion to use the nitrites more or less continuously.

One patient obtained little or no relief. Congestive heart failure was present when operation was performed. He was one of the early ones, suffering severely, and should not have been operated upon. He died a cardiac death three months after operation.

In conclusion, according to my limited experience in selected cases of angina pectoris superior cervical sympathectomy will bring complete or nearly complete relief in about 85 per cent of cases. The ultimate outcome, of course, depends on the underlying cardiac disease.

## REFERENCES

1. Blumgart, H. L.; Levine, S. A., and Berlin, D. D.: Congestive Heart Failure and Angina Pectoris; Therapeutic Effect of Thyroidectomy on Patients without Clinical or Pathological Evidence of Thyroid Toxicity, *Arch. Int. Med.* 51: 866 (June) 1933.
2. Coffey, W. B., and Brown, P. K.: Surgical Treatment of Angina Pectoris, *Arch. Int. Med.* 37: 200 (Feb.) 1923.
3. Jonnesco, T.: Operative Cure of Angina Pectoris, *Bull. Acad. de Med. Paris* 84: 93 (Oct. 5) 1920.
4. Kuntz, A.: Autonomic Nervous System; Essential Anatomy, *J. A. M. A.* 106: 345 (Feb. 1) 1936.
5. Mandl, F.: Paravertebral Anesthesia in Angina, *Wien. klin. Wchnschr.* 38: 759 (July 2) 1925.

## ALLERGIC REACTION FOLLOWING TRANSFUSION

### Report of a Fatal Case

J. DUFFY HANCOCK, M. D., F. A. C. S.

Louisville

SEVERAL weeks before the following case was seen, the dire consequences of allergic reactions following transfusions were impressed upon many of us by the report of such a case at a hospital staff meeting here in this city. In that case, the recipient was allergic to eggs, and the donor had eaten several a few hours before the transfusion. The discussion following that report recalled other but less severe reactions seen by various members of the staff. One of them suggested the advisability of a procedure he followed in having the donor fast for some hours previous to the transfusion whenever possible. This practice, so safe and at the same time so simple, seemed a most reasonable one to observe.

### REPORT OF CASE

A woman, aged 34, submitted to a cesarean section on Oct. 30, 1935, because of placenta praevia centralis with an accompanying 3-plus albuminuria. She was then at term and had had painless bleeding for about a month, the amount being dependent to a large degree upon the extent of exercise. No difficulties were encountered at the operation, but a small piece of placenta remained adherent and was extracted vaginally on the tenth postoperative day. The baby was nursed at the breast during all this period. On the twelfth postoperative day, evidences of mastitis appeared in the left breast and the patient began to have a headache which continued fairly constantly for the following few days. The cervix contracted normally, the lochia was usual in amount and odorless, there was no tenderness in the pelvis and the abdominal wound was clean. By the sixteenth day, the mastitis had definitely increased in severity but there was no fluctuation. The temperature went as high as 103, but there were no chills. While the patient was able to be up and about part of each day, she complained of weakness and headache. Her blood count showed that although the red corpuscles had remained at about 2,500,000, the hemoglobin had dropped from 75 per cent to 50 per cent. Because of these findings, it was felt that a transfusion would relieve to some extent all the symptoms and signs described. Her husband's blood was found to be compatible by a cross agglutination test, and he was instructed to fast for twelve hours preceding the transfusion.

This was given on the sixteenth postoperative day when the patient was feeling better than usual. Shortly after the transfusion was begun, she complained of a severe occipital headache. This headache became more pronounced and a slight urticarial rash appeared on the face. Examination of the rest of

Read before the Louisville Surgical Society, June 5, 1936.

the body showed the rash to be much more prominent on the legs. Although only about 350 c.c. of citrated blood had been given, the transfusion was discontinued, 15 minims of epinephrine solution 1:1,000 were given hyperdermatically, and the patient returned to her room. The pulse became quite weak and rapid and numerous urticarial spots appeared over the entire body. The headache, which appeared to be excruciating in severity, suddenly radiated down the spinal canal and then to the frontal area of the brain. Morphine sulphate gr.  $\frac{1}{4}$  was given and the epinephrine repeated. The headache gradually subsided, but in a very short time (within 15 minutes after the transfusion was stopped), the patient had a hard chill lasting 50 minutes and followed by a temperature of 104 and pulse of 160, weak in volume. There was some nausea and vomiting, neither severe nor persistent. As the reaction gradually subsided, the temperature began to decrease and the pulse to improve in rate and volume. Aside from an extreme thirst, the patient became comfortable, began sleeping at intervals, and seemed on the road to recovery.

The sleep, however, became deeper and two hours later, seven hours after the transfusion, the patient could not be aroused. Her pupils did not respond to light, and the breathing was deep and stertorous. Her appearance was so suggestive of cerebral edema that a spinal puncture was done. The fluid was under considerable pressure and as red as though it were undiluted blood. About 10 c.c. of the fluid was withdrawn. No improvement was noted after the spinal puncture. The breathing became more difficult and shallow, the pulse weaker and more rapid, and there was no return to consciousness. Death occurred ten hours after the transfusion, three hours after the loss of consciousness, and one hour after the spinal puncture.

#### COMMENT

It seems reasonable to assume in this case that there was cerebral edema analogous to the urticaria of the skin and that there was rupture of a cerebral vessel. Since the reaction certainly did not appear to be due to agglutination or hemolysis, in my opinion it must have been an allergic one.

Such cases are rare, but since fasting by the donor will obviously not prevent them and since the possibilities are so dreadful, the advisability of skin testing before transfusions, which has been suggested by others, may warrant serious consideration.



## RIEDEL'S THYROIDITIS

### A Suggestion as to Etiology and Surgical Management

R. B. McKNIGHT, M. D., F. A. C. S.

Charlotte, N. C.

THE term goiter has come to mean more than mere enlargement of the thyroid body; it refers to definite disease of this gland with fairly definite changes in the histologic structure together with a greater or lesser degree of alteration in its normal physiology. Goiter is best considered as a dysfunction of the thyroid gland. In Plummer's classification it will be recalled that thyroiditis is one of the divisions. Thyroiditis, as the name implies, is an inflammatory process of the thyroid gland. It is questionable if the various types of thyroiditis have been accurately subclassified on a sound clinical and histologic basis; the incidence of these conditions is rather infrequent and perhaps we forget there are causes of inflammatory reaction other than bacterial invasion. Clute and Lahey have suggested the following:

1. Simple Thyroiditis.
  - a. Primary in the thyroid.
  - b. Secondary to general infection.
2. Suppurative Thyroiditis.
  - a. Primary in the thyroid.
  - b. Secondary to general infection.
3. Chronic Thyroiditis (Including Riedel's Struma).
  - a. Primary in the thyroid.
  - b. Secondary to general infection.

The parenthesizing of Riedel's thyroiditis under the third division, chronic thyroiditis, may be construed as evidence that they consider this condition a disease entity, and that there is some doubt just where this disease belongs in such a classification. It has not been proved to be secondary to general infection.

Hertzler has classified the inflammatory conditions of the thyroid as follows:

1. Acute Diffuse Thyroiditis (Riedel's Struma).
2. Intracapsular Thyroiditis (Hashimoto).
3. Acute Limited Nonsuppurative Thyroiditis.
4. Acute Suppurative Thyroiditis.

He considers the first two groups identical in structure differing chiefly in the extent of involvement, the former (Riedel's) extending laterally over the large vessels into the sternomastoid muscle

Read before the Tri-State Medical Association of the Carolinas and Virginia, Columbia, S. C., Feb. 17 and 18, 1936.

and beyond, and having fewer infiltrating cells. Riedel's struma is classified as an acute condition. Clinically most of these cases are very acute and yet the pathologic picture is predominately that of a chronic process. Herein lies an interesting feature of a peculiar disease.

Just what is Riedel's thyroiditis? Crane believes it is a chronic primary inflammatory reaction of the thyroid gland, a distinct entity, as does Pulford who states in his discussion of Crane's article:

The study of excised thyroid glands shows that the type of inflammatory reaction seen in hyperfunctioning thyroid glands is mostly a lymphoid tissue increase and never a fibrous tissue replacement as described by Riedel. Seeing no transition state between hyperthyroid goiters and Riedel's thyroiditis, even after hyperthyroidism has come and gone, substantiates the claim that chronic thyroiditis is a primary disease entity. Acute thyroiditis either with or without suppuration, is a disease distinct from Riedel's thyroiditis.

Warthin emphasized the constant finding of hyperplasia of lymphoid tissue in exophthalmic goiters with the production of germ centers showing lymphoid exhaustion characteristic of the thymicolymphatic or Graves' constitution. He also believed that over-iodinization results in many cases of diffuse lymphoid infiltration and proliferation of connective tissue stroma presenting the picture of Riedel's thyroiditis. Cannot this picture, so frequently seen in exophthalmic goiter, be considered evidence of a definite inflammatory process? In this type of thyrotoxicosis there is an abnormal toxic internal secretion, not thyroxin at all, which may serve as a chemical irritant instigating an inflammatory reaction. Over-iodinization might supply such an agent in this particular tissue. Boyden, Collier and Bugher also believe the pathologic alterations in the thyroid gland following iodine ingestion in Graves' disease are the same type as in Riedel's thyroiditis varying only in degree. Actual proof however is lacking.

Hashimoto, in 1912, described a thyroiditis characterized by diffuse lymphocytic infiltration and the replacement of the thyroid acini by lymph follicles. He considered this a different form of thyroiditis from Riedel's struma. As a matter of fact, Riedel did not describe the pathologic picture as one of fibrous replacement and sclerosis, although such does occur, but did describe it first in 1896 as an accumulation of round cells sprinkled between normal thyroid tissue, by which the thyroid tissue is more or less destroyed. He stated in his original description that the hardness of the tumor is out of proportion to what one would expect in looking at the microscopic slides. Ewing believes Hashimoto's thyroiditis and Riedel's thyroiditis are different stages of the same disease, and there is abundant evidence to support this belief. It is difficult to

say, then, just what Riedel's thyroiditis really is. We know it is a rare and peculiar form of chronic thyroiditis characterized by diffuse inflammatory cellular infiltration with considerable fibrous tissue replacement of the acini.

The etiology is not known. Culture of these glands has proved nothing. It has been suggested that the teeth, tonsils or throat in some instances serve as instigating foci, but when one considers how many people have such foci, and how few develop Riedel's thyroiditis, this seems far-fetched. I suggest that Riedel's thyroiditis is an inflammatory reaction to some biochemical irritant, probably an abnormal type of thyroid internal secretion, and shall present the evidence derived from a single case report and comparative pathologic studies, hoping that some of the phantom pieces comprising the possible structure supporting this theory can be made real.

Grossly, the pathologic picture is fairly characteristic depending on the degree of fibrosis. The gland is enlarged, usually diffusely, and either one lobe or the entire gland involved. It is very hard, especially in the latter stage, and whitish in color. The capsule is thickened and there may be pericapsular extension. A cut surface shows an appearance somewhat similar to that of exophthalmic goiter, except that it is paler and dryer, and fibrous bands are more prominent.

Boyden, Collier and Bugher, in 1935, were able to collect only 163 cases from the literature. There were only 71 preoperative diagnoses listed, and 48 of these 71 were diagnosed malignancy. A positive diagnosis of Riedel's, Hashimoto's or chronic thyroiditis was made in only 11 cases and considered in but 8 others. Joyce, in studying 1066 thyroid cases from the Portland Clinic found only 5 cases of thyroiditis, 2 of which were frank abscesses of the thyroid. The Lahey Clinic reported only 22 cases up to 1932, and in a five year period 28 were found among the many thousands of goiter cases operated during that time at the Mayo Clinic. In ten years at Ann Arbor, Boyden, Collier and Bugher found only 9 cases in 2500 consecutive thyroidectomies. The average age is probably about 45, and it occurs in women approximately three and a half times as frequently as in men.

Since Riedel's thyroiditis is more of a pathologic than a clinical entity, the symptoms vary and are not constant. Enlargement is noted usually only a relatively short while before the patient consults the doctor. Dyspnea, especially in the recumbent position, is listed by many authors as the most common complaint. Choking and strangling sensations are often noticed, and dysphagia and

voice changes are not uncommon. Pain is infrequently referred to as a prominent symptom. The usual symptoms of hyperthyroidism are commonly present with a normal basal metabolic rate unless there is actual hyperthyroidism. The temperature will likely be about normal.

Examination of the enlarged gland usually leads one to make a preoperative diagnosis of malignancy. It is woody in hardness. The trachea may be displaced or constricted producing symptoms due to such displacement. X-ray examination will confirm this. Sometimes there may be a cervical adenitis.

The treatment is surgical, and the procedure employed should probably depend on the symptoms, the conditions found at operation and the judgment of the surgeon. Lahey suggests division of the isthmus to relieve constricting pressure against the trachea and has published an interesting technic. Most men advise subtotal thyroidectomy, with the caution that too much tissue not be removed, indeed less than would be removed in cases of toxic goiter. They base this argument on the premise that these patients are more prone to myxedema than any other thyroid group, and that for this reason more tissue should be left. With this argument I do not entirely concur, and suggest as a hypothetical basis for such disagreement that it is the marked destruction of the parenchymatous tissue of the thyroid gland which frequently leads to a myxedematous state, rather than the amount of such diseased tissue removed. Following up this hypothesis, certainly in selected cases, I suggest radical resection—almost complete lobectomy—as I see no reason for leaving this diseased tissue in the body. In such a belief I do not stand alone.

#### REPORT OF CASE

A white matron, aged 34, weight 152 pounds, was first seen Sept. 9, 1935, complaining of pain and swelling in the right side of the neck in the region of the right thyroid lobe. She had first noticed enlargement and pain three weeks before and consulted an otolaryngologist, as she thought she had "throat trouble." Examination revealed nothing abnormal in the mouth or upper respiratory passages and she was referred to me with a tentative diagnosis of goiter.

Careful questioning elicited the following:

At no time previously had she had any symptoms even remotely referable to the thyroid gland, or any other glands of internal secretion. She had never taken iodine. *Pain was the predominant complaint.* It was a dull, constant ache and when first seen her temperature was normal. There had been some dyspnea especially when recumbent. She had lost five pounds in about three weeks. Some symptoms of hyperthyroidism were present such as nervousness, moderate palpitation, emotional instability characterized by a tendency to cry



easily and a slight, fine tremor of the fingers. These had been present only during her illness.

She was well nourished but pale. Examination was negative except for a very hard and extremely painful tumor of the right thyroid lobe. Blood pressure was within normal limits, basal metabolism plus 10, the urine showed nothing significant, white blood count 6,400 and hemoglobin 50 per cent.

A diagnosis of malignancy of the thyroid was made and operation under a basic anesthetic of nembutal and para-cervical block and local infiltration with 1 per cent procaine was performed Sept. 13. The right lobe was symmetrical-



Fig. 1. Almost total lobectomy was performed on the right side at the first operation. Only a minute amount of tissue was left at the upper pole. The striking characteristics of the specimen were the woody hardness and pale color. The left lobe was not photographed, but it presented an appearance not unlike that of the right. Only a minute amount of tissue was left on the left side.

ly enlarged, very hard, well encapsulated and pale in color. Almost total lobectomy was performed, leaving only a minute amount of tissue at the upper pole. The isthmus and left lobe were explored and found to be entirely normal in size, color and consistency, and were not disturbed. The tumor was confined entirely to the right lobe (Fig. 1).

Pathologic report No. 5847: "Thyroid lobe 3 by 3 by 5 cm. in size, consisting mostly of very firm whitish tissue with small radiations extending into the thyroid tissue. Microscopically this thyroid shows much fibrous tissue in which there is an eosinophilia, round cell infiltration, polynucleosis, foreign body giant cells, and islands of thyroid acini undergoing atrophy at the periphery. On one side is some fairly normal thyroid tissue. I consider this a definite inflammatory condition. It is designated by several terms: Riedel's struma, woody thyroiditis and called by Ewing benign granuloma of the thyroid." (Fig. 2). This report is by Dr. T. H. Byrnes.

Her postoperative course was entirely normal. She left the hospital on the fifth day after operation and in less than two weeks the wound had healed. She had complete relief of her symptoms.

Exactly three weeks later she noticed pain and swelling in the left side of the neck, this time accompanied with an irregular fever curve ranging from 98.6 to 102. *Her complaint was pain, excruciating in character and requiring narcotics for relief.* Other symptoms were of minor importance. She was treated at home for two weeks; ice bags gave little or no relief when hot water bottles were applied with equally unsatisfactory results. She was admitted to the hospital on October 22 where local treatment could be carried out more effectively. On admission her temperature was 99.4 and soon rose to 102. It then subsided only to flare up again. The urine showed nothing of impor-

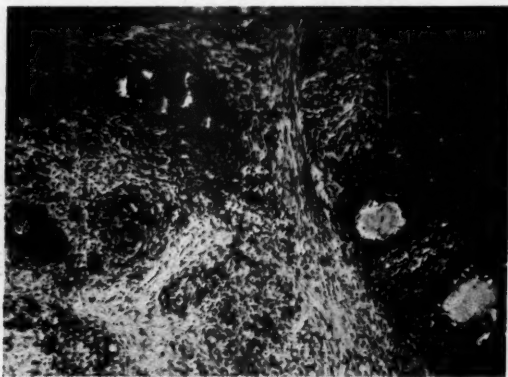


Fig. 2. Low power microphotograph of the right lobe. The chief features are: (1) Marked replacement of glandular tissue by loose and dense fibrous tissue. (2) Degeneration and destruction of glandular tissue. (3) Heavy leukocytic infiltration largely of lymphocytes, although there are some polynuclears, eosinophils and monocytes present. (4) The acini present are small and in some the epithelium has the character of a syncytium. (5) Some of the acini contain colloid and others are devoid of colloid. In some the colloid contains leukocytes. The colloid takes a basophilic stain. (6) There are numerous foreign body (pseudo) giant cells.

tance, there were 8,700 white blood cells with 82 neutrophils, 3 eosinophils, 12 lymphocytes and 3 mononuclears. Hemoglobin was 80 per cent. Basal metabolism was not repeated. *The pain became so intense that she actually demanded surgical intervention.* On October 28 the isthmus and left lobe were explored. There was some pericapsular inflammation, the capsule was thicker than it had been on the right and the tumor extremely hard. Otherwise it presented practically the same picture as the right lobe had shown six weeks before. Almost a complete lobectomy was done with considerable difficulty. (The right lobe operation had been quite easy.) There was much oozing from the bed, due undoubtedly to the pericapsular inflammation. This was controlled with iodoform gauze packing.

After operation the temperature returned to normal except for a slight postoperative rise, and she made a rapid recovery. Within a month the wound had healed, and she has remained well with no complaints and no symptoms of myxedema after four months.

Pathologic report: "The gross specimen is an ovoid structure 2.5 by 2.5 by 4.0 cm., mostly composed of firm white tissue with a mottled cut surface and

some soft brown tissue at one end. Microscopically it is thyroid tissue showing a non-specific granulomatous inflammation. It is the same as that described in report No. 5847, and I presume it is from the same patient." (Fig. 3).

#### COMMENT

There are some interesting features about this case. This woman is not the constitutional Graves' type. She is a mother of two children and has always enjoyed good health and is not a nervous, apprehensive, emotional individual. There was no history or evidence of acute infection preceding her illness. The attacks came on suddenly in an apparently normal person, and nothing could be elicited to throw any light on the possible etiology.



Fig. 3. Low power microphotograph of the left lobe. The same features are present as in the right only more advanced.

*Pain was the predominant symptom, especially when the left lobe became involved.* Few observers give pain as a prominent symptom, but it was so acute in this patient that she insisted on surgical relief. I suggest that this pain was due to subcapsular tension. The capsule was thickened and tense in both instances, and on the left side there was some evidence of pericapsular involvement. At the second operation the thought occurred to me to perform capsulotomy for relief of tension, but I could see no sound reason for so doing, in view of the marked glandular destruction the right lobe had shown and the obviously same pathologic process in the left lobe as viewed at operation.

The operation as suggested by Lahey could not have given her relief as it was not tracheal constriction or compression with resulting symptoms that gave her distress, nor do I believe it would have

been sound judgment in this particular case to have done only partial resection. There was nothing left but practically complete lobectomy.

The absence of a leukocytosis during her illness is striking. One would expect a definite increase in leukocytes, certainly during the second exacerbation, and the chances are this would have occurred if there had been a bacterial cause. Furthermore, none of these reported cases of Riedel's thyroiditis have progressed to abscess formation, in spite of the fact that a number were not operated upon, and many had only resection or division of the isthmus done. Is it not likely that abscess formation would have occurred in at least a few, if bacterial invasion has anything to do with the etiology? The differential count showed 82 neutrophils and 3 eosinophils. The pathologic reports showed an eosinophilia. I have no explanation to offer for this.

The sequence of events in this patient is interesting, and I have been unable to find a similar one in the literature. At the first operation the isthmus and left lobe were as normal grossly as any thyroid I have ever seen. Was there an extension process from the original inflammation in the right lobe? If so, why did it take three weeks and then appear suddenly as out of a clear sky, especially in the presence of such extensive involvement of the right lobe? An inflammatory reaction to bacterial invasion would hardly have been so latent. It came on just about as suddenly in the left lobe as in the right. Why did she have a fever in the second phase? Was it due to pericapsular involvement? And if so, why did it not persist following operation? It is not likely that healing in both instances would have taken place with such reasonable promptness had this been an inflammatory reaction of bacterial origin. Yet the picture is certainly that of an inflammation.

Any pathologist knows that inflammatory reaction can be brought about by causes other than bacterial invasion. Perhaps we are prone to forget this fact. Why should the pathologic picture of exophthalmic goiter frequently show dense round cell infiltration? The evidence that this disease is not of bacterial origin is fairly conclusive. We know that there is an abnormal toxic internal secretion in these goiters, a biochemical irritant in all probability, which may serve as the instigator of the inflammatory reaction. Iodination or overiodination probably contributes to the picture in the hyperplastic type of goiter. Pathologic examination of Riedel's struma shows a strikingly similar picture in so far as inflammatory reaction is concerned. In the latter there is more fibrous tissue replacement and the remaining colloid takes a basophilic stain. I suggest that the



pathologic picture of Riedel's thyroiditis is due to some as yet obscure biochemical irritant, differing from that produced in or causing exophthalmic goiter. Its possible source? When this is answered we must know more about cellular chemistry and physiology, especially of the endocrins, sympathetic nervous system and perhaps of the reticulo-endothelial system.

#### SUMMARY

1. A case of Riedel's thyroiditis, (ligneous thyroiditis, woody thyroiditis, chronic primary thyroiditis, benign granuloma of the thyroid) is reported.
2. Some interesting features, particularly the sequence of events described, make the case unique.
3. A theory is suggested as to the possible etiology and some evidence offered to substantiate it.
4. Some evidence is presented to substantiate the claim that radical resection is the operation of choice, certainly in selected cases.
5. Riedel's thyroiditis is probably a disease entity.

Professional Bldg.

#### REFERENCES

1. Boyden, A. M., Coller, F. A., and Bugher, J. C.: Riedel's Struma, Tr. Am. A. Study Goiter p. 35-62, 1935.
2. Clute, H. M., and Lahey, F. H.: Thyroiditis, Ann. Surg. 95: 493 (April) 1932.
3. Crane, W.: Chronic Thyroiditis, California & West. Med. 35: 443 (Dec.) 1931.
4. Ewing, J.: Neoplastic Diseases, 2nd ed. Philadelphia: W. B. Saunders & Co., 1922.
5. Hashimoto, H.: Quoted by various authors.
6. Hertzler, A. E.: Diseases of the Thyroid Gland, 3rd ed. St. Louis: C. V. Mosby Co., 1935.
7. Joyce, T. M.: Thyroid Surgery at the Portland Clinic, Ann. Surg. 94: 563 (Oct.) 1931.
8. Lahey, F. H.: Thyroiditis, An Operative Procedure for the Relief of Tracheal Constriction, Surg., Gynec. & Obst. 60: 969 (May) 1935.
9. Pulford, D. S.: Discussion of Crane's article, California & West. Med. 35: 446 (Dec.) 1931.
10. Riedel: Quoted by Boyden, Coller & Bugher and others.
11. Warthin, A. S.: Pathological Conditions Arising in Goiter During Iodine Treatment, Ann. Clin. Med. 4: 686 (Feb.) 1926.

---

NOTE: The patient is entirely well ten months after her second operation. Basal metabolism has not been repeated, but there is no clinical evidence of hypothyroidism. She has no complaints and is clinically a normal woman.

## LESIONS OF THE BREAST

J. W. TANKERSLEY, M. D., F. A. C. S.

Greensboro, N. C.

**W**HEN lesions of the breast are considered, of course our first thought is of cancer. However, there are many other lesions other than cancer which come to our attention:

a. Supernumerary breasts.

b. Lipomas are fairly rare, although they are occasionally encountered.

c. Hypertrophy may be unilateral or bilateral. The nipples become flattened and are frequently inflamed.

d. In acute *mastitis* the nipples and ducts are the seat of an inflammatory process. The condition is medical: syphilis and tuberculosis must be ruled out. Chronic mastitis is more frequent between the ages of 35 and 45. Its essential pathology is epithelial hyperplasia in the terminal ducts.

e. Mastodynia, or neuralgia of the breast, occurs particularly in the young, and is frequently due to engorgement; but cysts and fibromas may give rise to this symptom.

f. Fibromas. Encapsulated fibroadenomas and periductal fibromas are usually found in women under 30 years of age. Either may become malignant.

g. Myxomas are larger than fibromas, are usually edematous and found in older women. They may become necrotic with subsequent enlargement of the axillary glands.

h. Cysts are common. The cystadenomas (fibrocystadenomas in young women) are usually simple cysts of two types. (1) Those with a desquamative hyperplasia, discrete and later diffuse, cause much pain. They are seen in fibroadenomas. (2) The second type exists alone and is painless. They begin in the ducts and acini, form a colostrum-like secretion, the ducts and acini become distended by the secretion to form cysts, and later they may become papillomatous with a bloody discharge. They occur usually in women under 30. The simple retention cysts, or the blue-domed cysts of Bloodgood.

Malignant diseases of the breast are carcinoma, sarcoma and Paget's disease. For clinical purposes the carcinomas are divided into:

Read before the Seventh Annual Assembly of The Southeastern Surgical Congress, in New Orleans, March 9, 10 and 11, 1936.

- a. Simple carcinomas where the tumor is made up of the ordinary amount of epithelial cells and connective tissue.
- b. Scirrhus carcinomas. The hard tumor where there is a preponderance of connective tissue.
- c. The medullary or soft cancer which has an excess of epithelial tissue and a small amount of connective tissue.
- d. Diffuse carcinoma involves a large part of the breast without a definite nodule.
- e. Adenocarcinomas have a marked tendency to produce tubules lined with carcinomatous cells.
- f. The squamous cell carcinoma grows from the surface.
- g. Colloidal carcinomas are gelatinous.
- h. Carcinomatous cysts.

Pathologically the malignant diseases of the breast are best grouped according to the 1 to 4 grading suggested by Broders. The grade of malignancy depends on the deviation of the malignant cells from the normal.

These two groupings will come nearer meeting our purposes and certainly tend to simplify matters for the surgeon. Far more important than any classification is a consideration of the extent of the growth from the standpoint of time of the growth.

The general physical examination should be thorough and made with the proper exposure. I recall one woman who came to consult me about an abdominal complaint. In the course of her examination I discovered an extensive carcinoma of the right breast with metastases to the axilla. She had paid little attention to this as she said it had caused no pain. In the examination the patient should be stripped to the waist and careful inspection made of both breasts for comparison. The texture of the skin, stippling, discoloration, elevation or retraction of the nipples should be noted. A good way to palpate the breast is to stand behind the patient, placing the forearms over the shoulders so that the flat surface of the hands will cover the breasts. This enables one to press against the chest wall to determine if there is any unevenness or any lumps to be felt. The nipples may be then drawn out to see if they are fixed, felt to determine if there are any elongated or hardened ducts, and squeezed to find out if any secretion can be expressed. The character of the secretion gives important information. Should the secretion be bloody it is most apt to be an intraductal papilloma. If the duct from which the secretion is expressed is found to be markedly thickened, then it is most apt to be associated with carcinoma. When multiple nodules

are felt they may almost invariably be classed as non-malignant, always bearing in mind that occasionally cancer occurs as multiple foci.

Movement of the breast determines if there is fixation to the chest wall, muscles or skin. In some clinics as high as 82 per cent show fixation to the skin, and of these, 72 per cent have developed metastases.

Having determined there are lumps, unilateral or bilateral, their firmness, fixity, cystic character and so on, we next examine the axilla. The arm should be relaxed in order to feel under the pectoral muscles. Even then under the most favorable circumstances we cannot always feel these glands, especially in obese patients. (The Mayo Clinic reports 29 per cent axillary involvement even when they cannot be felt.) Transillumination may then be tried, using a strong light and viewing the breast from all angles. This aids in determining if the lump is solid or cystic. It should be done in a dark room to be of real value.

Finally, if there is any doubt, the patient should be prepared for radical operation and the tumor removed for biopsy. This can be done under local anesthesia and the patient kept on the operating table until the pathologist reports on the specimen. Should a competent pathologist not be available, one must rely on one's own judgment and experience. If an error is to be made, let it be on the side of radical removal. The mortality rate is so low in radical amputation and so high following delayed operation in malignancy that one is not justified in waiting.

It has been my plan to have frozen sections made at once and to be prepared to continue with the radical operation when necessary. Experience has taught me that when a cancer mass is cut into and several days elapse before its removal, growth and metastasis are markedly stimulated. I would also like to caution that when a specimen is removed for biopsy the entire nodule should be removed.

What I have seen of the x-ray as an aid to diagnosis, has not impressed me with its usefulness. I have seen many interpretations of the x-ray where the imagination was stretched considerably to make the picture tally with what is suspected. I do believe, however, a careful check of the chest and spine for metastases should be done. I find this particularly true of nodes in the upper and upper-inner angles of the breast. When there is evidence of internal involvement it is useless to subject a patient to an operation that will entail more suffering and certainly not benefit her condition.

We must consider heredity as a factor. Whether or not cancer is hereditary is debatable; but I firmly believe family predisposition



plays an important part, even with certain authorities to the contrary. It cannot be a coincidence that so many members of a family die of cancer, especially the female side. I had one patient whose mother, two sisters and several aunts died of cancer. She herself carried a lump in her breast for seventeen years before coming to see me. On removal it proved to be a scirrhus carcinoma.

Finally, in our examination, due consideration should be given to history taking. I frequently ask: "How did you discover the lump?" If the patient says she felt pain in the breast I breathe a sigh of relief, as pain accompanies benign and inflammatory lesions. Should she say the discovery was accidental, "just happened to feel the lump in the breast", then the possibilities are great. The burden of the proof of it being benign rests with us. When we realize that the average so-called five year cures is not over 25 to 30 per cent, we must be candid in admitting that it is better to subject the patient to a radical operation than run the risk of losing 60 or 70 per cent within five years.

In Willis' series of 484 cases, the percentage of cures for five years, where lumps could be felt in the breast (but no glands palpable) was 72.8 per cent. No other cancer in the body shows such a wide distribution in metastases as does cancer of the breast. According to Warren, of Boston, in 162 autopsies on patients who died from cancer of the breast, next to the axilla, bone, brain and lungs were the most frequently involved. Is a five year cure a guarantee of ultimate cure? In a majority of cases it may be; but the man that makes a dogmatic statement in medicine or surgery is headed for a pit-fall. I have seen recurrences after seven years and have only recently seen a case I had marked as a five year cure in which metastasis has now developed in the brain. Recurrence in the scar may be (and usually is) the fault of the surgeon; but certainly metastases to distant organs cannot be laid to his technic.

What is the effect of cancer propaganda on the public? There is no doubt that the public has become cancer-minded. A considerable number have developed cancerphobia; but this has its good points, it is bringing the suspicious patient to us sooner for examination. If we can by any means bring these patients in for examination we are going to catch the lesions earlier, which means a greater percentage of cures. One point I would like to stress strongly is: when you find a patient with a lump in the breast do not keep her under observation to see what it is going to do. Send her immediately to the hospital so that a definite diagnosis can be made by biopsy.

So far I have refrained from mentioning radium and x-ray in treatment. In inoperable cases I believe that either radium or x-ray

therapy will relieve patients for a considerable time; but I doubt the cures. My personal experience has been with the use of either radium or x-ray postoperatively, and I believe my percentage of cures will compare favorably with that of the average clinic. I use x-ray treatment postoperatively, and in some cases do not wait for the wound to heal before beginning radiation. Since 1913, Finsterer has advocated exposing the cancer and applying the x-ray directly to the growth. Most authorities believe that irradiation before operation is of little value, for in cases where irradiation is necessary to operation, the cancer has spread to such an extent that operation can be only palliative. Considerable time may be lost while the extension goes on increasing even though superficial lesions may be apparently receding.

As I have said before, a large number of growths we remove today are benign. One of the most frequent lesions we find is chronic cystic mastitis. Sir Lenthal Cheatele considers this a misnomer—it is really a hyperplasia. Cutler says it is a mazoplasia, and describes it as a hyperplasia of the pericanicular and periacinous connective tissue, new formation of ducts and acini and a desquamation of epithelial cells in the terminal ducts and their acini. The ducts and acini become distended and give rise to pain and generalized nodules (lumpy breast). It is often bilateral and does not show any other of the classical conditions found in cancer. When the breast is palpated it will be found to be tender (at least in spots), the ducts are hard and can be rolled under the finger, or they may feel shotty in character. The menses are usually scanty, and the ovaries hyperfunctioning. According to autopsies performed by Goens there was evidence of chronic mastitis in one-third of all women over 40 years of age. It is most common in women between 30 and 40 years old. Occasionally, or independently, these ducts may become enlarged and cystic, and sufficient numbers of them may coalesce to form a typical blue-domed cyst. Small cysts may develop in the breast. These usually occur between the ages of 20 and 30. Just as papillary tissue will grow anywhere epithelial tissue grows, we may find papillary tissue growing within ducts, either within cystic ducts or normal ducts. These papillas may be small and scattered, or confluent to form definite lumps. They are to be found most commonly between the ages of 30 and 40. These papillomas are the source of bleeding, and, I believe, are the definite forerunners of cancer. Until this question is definitely settled, I shall continue to remove the entire breast and likewise the glands where there is the slightest suspicion of their involvement. Cutler says that they appear in sequence, first cystic, then papillomatous, then cancerous. In two cases occurring

in my series papillomas were found undergoing malignant changes.

One of the commonest forms of breast tumors, to be found usually in young girls under 20 and between 20 and 25, are fibromas. They are usually unilateral, encapsulated, hard firm tumors, small in size, and cause little pain. Rarely do they become very large. These tumors may be periductal with either fibrous tissue predominating (fibroadenomas) or adenomatous tissue predominating (adenofibromas). Since they contain glandular tissue, of course there is always the possibility of their undergoing malignant changes. These adenomas may also become cystic, forming the fibrocystadenomas (or cystadenomas). Possibly these become the myxomatous tumors of older persons, when they may reach a large size and may be very edematous or necrotic.

An example of the many rather rare conditions to be met with in breast tissue is mastodynia. This condition may be met with in engorged breasts and occasionally associated with cysts and fibromas. This is not to be confused with the simple engorgement of menstruation. Simple hypertrophy, bilateral, or occasionally unilateral, may occur. The so-called unilateral ones are most apt to be lipomas. There are so many variations from the normal it is sometimes rather hard to say a breast is hypertrophied.

Paget's disease is to be found in both sexes; but of course is more common among females. I have had only two cases in males. It is to be found around the nipple and is undoubtedly malignant and should be treated as such. It is readily recognized by the eczematous-like erosion around the nipple, and whether it starts from within or without is of academic interest only.

To give statistics on my short series would be repetition of experience of others, and would shed little light on the subject. Suffice it to say, in the period 1921 to 1931, I have operated on 84 patients with breast cancer. Approximately 30 per cent are living today, several having died of independent diseases other than cancer. In addition there were two cases of Paget's disease in men and one case of sarcoma in a woman; these three patients are living and well today.

During the past 14 years I have had no hospital deaths, and previous to 1921 there was only one. The right and left breasts have been about equally involved and the average age incidence has been 47 years.

The only conclusion I have learned of any value is that every lump, not clearly shown to be cystic, should be removed from the breast, and the sooner this is done the better will be our five year cures.

# COMPLICATIONS AND END RESULTS ASSOCIATED WITH THE INJECTION TREATMENT FOR HERNIA

CARL O. RICE, M. D. and LAWRENCE M. LARSON, M. D.

Minneapolis

The efficacy of any new method of treatment of a disease cannot become well established until adequate proof is brought forward to demonstrate the fact that the method has advantages over an already well accepted one or certainly that at least it is not inferior to those types of therapy already in vogue. It is for this reason that an effort has been made to investigate thoroughly the injection method of treating hernia to either prove or disprove its worth as a therapeutic agent.

## REVIEW OF THE LITERATURE

*End Results and Complications:* Review of the literature reveals a relative paucity of work on this subject. Wollermann, in 1929, made a comparative study of the operative and the injection method for treating hernia. His figures dealing with the injection method were obtained from cases in his own clinic of individuals who had been treated between the years 1904 and 1928. The surgically treated cases were taken from the records of the Heidelberg University Clinic between the years 1899 and 1906, and were under the supervision of Czerny. Though the years in which these latter observations were made are not identical with those in which the injected series had been taken, the surgical treatment of hernia by this time had been fairly well standardized and the end results compare favorably with those which have been reported at a later date. His results are tabulated as follows:

|   | <i>Injection<br/>Method</i> | <i>Operative<br/>Method</i> |
|---|-----------------------------|-----------------------------|
| Total Number of cases treated   | 2949                        | 1140                        |
| Exaggerated reactions and swelling<br>without suppuration.<br>(Hematoma, small abscesses) | 33 (.55%)                   | 130 (10%)                   |
| Prolonged suppuration. (Deep<br>abscesses, fecal fistula, etc.)                           | 20 (.7%)                    | 23 (2%)                     |
| Testicular atrophy  | 1 (.04%)                    | 5 (.4%)                     |
| Deaths  | 1 (.04%)                    | 5 (.43%)                    |

Many of the cases treated by the injection method, which Wollermann saw, could not be satisfactorily controlled because of the failure of the patient to cooperate in wearing the truss, his inability



to return for treatment, or because of other uncontrollable conditions. These factors are admittedly a frequent disadvantage of the method, but to them cannot be attributed all the failures of this type of therapy. In spite of these handicaps, Wollermann found that the incidence of cures, reported from 1042 of these injected cases which were adequately followed and controlled, was 94 per cent; an additional 1.5 per cent showed considerable improvement and 4.5 per cent showed recurrences.

Campos and Subirachs reported the results of treatment on 202 cases. Sixty-four of these (31.6 per cent) were cured; fifty-eight (28.7 per cent) were improved; and eighty (39.6 per cent) were failures. In their series of cases there were patients who had been previously operated upon and patients who were not in good condition for this type of treatment; such as those having chronic cough, asthma, enormous hernia, and so forth. Of 100 patients having such hernias difficult to cure, 64 obtained satisfactory end results, a percentage which, no doubt, was higher than could have been obtained by surgical treatment of these same cases.

Warren found that he obtained cures in 80 to 85 per cent of his cases but gave no statistics upon which his estimations could be based. Bratrude reported 406 hernias under treatment with 4 per cent recurrence and only three definite failures. The eventual result in all these has not been obtained.

Statistical data from those men who have reported their cases in more or less detail is recorded in the following chart:

|                      | <i>Number of hernias treated<br/>and controlled Recurrences</i> |          | <i>Eventual cures</i> |
|----------------------|---|----------|-----------------------|
| Karl E. Kretzschmar  | 140   | 3        | 140 (100%)            |
|                      | (all cured eventually)  |          |                       |
| Ignatz Mayer         | 2100  |          | 2058 (98%)            |
| Campos & Subirachs   | 202   | 80       | 64 (31.6%)            |
|                      |   | failures |                       |
|                      |   | 58       |                       |
|                      |   | improved |                       |
| F. S. Jameson        | 64  | 4        | 62 (96.8%)            |
|                      | (2 of these cured subsequently)                                 |          |                       |
| Ralph Wolfe          | 22  |          | 19 (86.2%)            |
| Franz Wyss           | 2775  |          | 2531 (91.2%)          |
|                      | (Inguinal)  |          |                       |
| Geo. B. DeLisle Gray | 25  |          | 18 (76%)              |
| A. F. Bratrude       | 180   | 4        | 179 (99.4%)           |
|                      | (3 subsequently cured)  |          |                       |
| Wollermann           | 1042  |          | 978 (94%)             |
|                      | 6550  |          | 6069 (92.6%)          |

These figures are a fairly good representation of the results which can be expected by this method of treatment in the hands of those who have mastered the technic.

LaRochelle stated that the most common complication was abscess formation at the site of injection. Other complications which he observed were signs of peritoneal irritation with shock-like reactions from injection of the solution into or near the peritoneum, injection into the cord with thrombosis and hydrocele of the cord, urticarial reaction in a hypersensitive individual from the use of a tannic acid-alcohol mixture and one case of fecal fistula. The incidence of these complications was not stated.

Wyss mentioned that approximately 100 cases out of 2084 individuals treated by the injection method, developed complications of one form or another. Among these he mentioned one case of peritonitis, 25 cases of abscess formation, 9 cases of hydrocele, and 4 cases of orchitis with subsequent atrophy in two of these. The other complications he stated were minor in nature and were not described.

Goldhahn condemned this method of treatment and in substantiation of his claims reported six cases. Three of these had fecal fistula, one had a gas phlegmon, one developed testicular atrophy, and one case failed to receive a cure. The incidence of these complications was not mentioned. Jacobi later published a statement to the effect that Goldhahn was not justified in so unreservedly condemning the injection therapy since these six cases represent the reported complications from at least 10,000 cases of hernia which had been treated by this method. Jacobi stated also that in a similar number of cases treated by surgical methods, a much more formidable list of complications could be presented.

Gibson and Felter found complicating factors occurring 368 times in 1618 surgical cases of hernia. Some of the complications were evidently not the result of the operation but were associated with it. Among these were bronchitis 32, pneumonia 34, cough 30, influenza 1, infarct 8, embolism 1, empyema 1, pulmonary tuberculosis 5, laryngitis 1, epididymitis 2, orchitis 21, spermatocoele 1, hydrocele 74, and varicocele 23.

Among the complicating factors which appear to have followed as a direct result of the operation were hematoma 59, cut vas 2, bladder opened 2, cord cut 1, sigmoid nicked 1, artery torn 1, and infection 70. There were, in this group of cases, 8 deaths with a mortality of 0.49 per cent. Two and nine-tenths per cent of the patients had recurrences of the hernia and 72.9 per cent of these recurrences appeared within the first year. The incidence of re-

currence in their series from direct inguinal hernia was 6.5 per cent and that from the indirect inguinal was 1.3 per cent. Eight and seven-tenths per cent of those who had bilateral operations developed recurrences on one or both sides.

Catell and Anderson found, in 194 operations for hernia, 6.7 per cent with recurrence. When bilateral operations were performed 18.1 per cent had recurrences and 11.7 per cent of the cases involving fascial repairs developed recurrence. Block, in a study of a large series of cases of hernias from a number of European clinics, found an average operative mortality of .8 per cent and an average rate of recurrence of 3.5 per cent for the entire group of individuals. Andrews and Bissell have presented a table showing the number of recurrences from direct inguinal hernia. Their figures are taken from institutions where the quality of the work is of exceptionally high standard such as Johns Hopkins Hospital, the Massachusetts General Hospital and the Presbyterian Hospital in New York as well as from several foreign clinics. These figures show that the percentage of recurrences range from 4.1 to 32 with an average of 20 per cent. These men remark that the results are so bad as to constitute a major surgical scandal.

#### RESULTS OF QUESTIONNAIRES

Numerous ethical physicians throughout the country have been using the injection technic of treating hernia for the past few years. In an effort to obtain opinions, relative to this method and to determine the end results obtained by the profession at large, form letters were sent out to 57 doctors who have been interested in this method. Responses were received from 23 doctors.

A total of 2250 cases were treated by these doctors. In thirty-four patients there was not sufficient time in which to determine cures, leaving 2216 cases as the total upon which this portion of the report is based.

There were 1914 cases (85 per cent) which had been pronounced cured. The average number of injections per patient for the entire series was 11. A large number of solutions had been used but the solution of choice, with 13 of these 23 doctors, was designated to be synlasol, proliferol, galtanol, La Rochelle's solution, Pina-Mestre's solution, Mayer's solution, thuja mixture, tannic acid and alcohol mixture, alusol and a few independently prepared solutions, the principal ingredient of which was tannic acid or zinc sulphate, were used with success by several physicians.

Complications reported in this questionnaire were relatively few. No fatality was recorded. Four doctors reported that they had observed sterile abscesses; in four cases the occurrence of peritoneal irritation took place; 6 reports indicated the occurrence of induration of the cord; one doctor reported the development of a slough of the skin; acute severe pain after the injection of the solution was noted by four physicians; eight doctors stated that they had encountered no complications. The incidence of these complications was not determined but from the comments which were made in the letter it was found that the complications were neither frequent nor serious. Only three of these physicians expressed any definite objection to the treatment and the remaining twenty did not consider their complications as of a serious nature. Some mentioned that their complications were due to errors in technic such as the use of very caustic solutions or of making injections too deep. Other errors consisted of the injection of the sclerosing solution too soon after the application of the truss, injecting without being certain that the contents of the hernial sac were completely reduced or constantly maintainable with a truss.

#### THE AUTHORS' SERIES

A review of our records, of private patients and individuals examined in the hernia clinic of the Minneapolis General Hospital, is incorporated in the following table:

CHART NUMBER 1

|  |       |
|--|-------|
| Total number of right indirect inguinal hernias.....           | 289   |
| Total number of left indirect inguinal hernias.....            | 218   |
| Total number of bilateral indirect inguinal hernias.....       | 103   |
| Total number of right direct inguinal hernias.....             | 45    |
| Total number of left direct inguinal hernias.....              | 42    |
| Total number of bilateral direct inguinal hernias.....         | 35    |
| Total number of left femoral hernias.....                      | 0     |
| Total number of right femoral hernias.....                     | 9     |
| Total number of bilateral femoral hernias.....                 | 1     |
| Total number of right postoperative femoral hernias.....       | 1     |
| Total number of right postoperative inguinal hernias.....      | 29    |
| Total number of left postoperative inguinal hernias.....       | 37    |
| Total number of bilateral postoperative inguinal hernias.....  | 4     |
| Total number of umbilical hernias.....                         | 18    |
| Total number of epigastric hernias.....                        | 4     |
| Total number of postoperative incisional (ventral) hernias.... | 42    |
| Undetermined diagnosis (hernia).....                           | 5     |
| Total number of individuals.....                               | 804   |
| Total number of hernias.....                                   | 1,025 |



Ten of the inguinal hernias presented both indirect and direct hernias on the same side. These have been included in the above tabulations.

A review of these tabulations reveals a total of 713 indirect inguinal hernias, 157 direct inguinals, 12 femoral hernias, 4 epigastric, 18 umbilical, 42 postoperative incisional (abdominal), 74 postoperative inguinal, and 5 with diagnosis undetermined.

*End Results:* A large percentage of the patients seen at the hernia clinic of the Minneapolis General Hospital are transients or individuals with whom cooperation is obtained with considerable difficulty. This fact makes adequate follow-up data difficult to obtain. However, from our records we ascertained the following: In 213 cases treatment was advised but was not given because the patient did not return; 115 cases were referred directly for surgery since it was felt that in these patients the hernia would not respond favorably to the injection treatment; 97 of the patients either did not receive sufficient treatment to pronounce a cure of the hernia or did not return for the final check-up so as to definitely ascertain a cure. Some of the latter were, no doubt, cured but these were not included in the list of known results. In 379 of the individuals definite cure was obtained and in only 11 was there an outright failure of the treatment to produce a cure of the hernia. Thus, if only the controllable cases are calculated, we find that 97.6 per cent resulted in a cure.

*Complications:* Seventy-eight out of 445 patients cured of hernia developed complications at one time or another during the course of the treatments. These complications were as follows:

CHART NUMBER 2

|   | <i>Cases</i> |
|---|--------------|
| Induration of the cord.....   | 44           |
| Superficial ulceration of the skin as a result of the truss irritation... | 8            |
| Severe pain suggesting peritoneal irritation.....                         | 10           |
| Chemical peritonitis .....  | 2            |
| Epididymitis .....  | 1            |
| Edema of the leg.....   | 3            |
| Hematoma .....  | 2            |
| Hydrocele of the cord.....  | 7            |
| Dermatitis .....  | 1            |
| Local abscess .....   | 2            |

The incidence of these complications was approximately the same for the entire group of individuals treated whether or not they were cured. These figures are indicated in tables 3 and 4.

## CHART NUMBER 3

## Complications Occurring in Cured Cases Only

|                      | Total No. Injections |         | Average No. | Unfavorable Reactions | Per-centage |
|----------------------|----------------------|---------|-------------|-----------------------|-------------|
|                      | Individuals          | Hernias | per hernia  | Total No.             |             |
| Rt. Ind. Ing.        | 118                  | 171     | 8.5         | 22                    | 1.5         |
| L. Ind. Ing.         | 104                  | 157     | 8.0         | 29                    | 2.3         |
| Bil. Ind. Ing.       | 53                   | ...     | 9.5         | 6                     | 2.4         |
| Rt. Dir. Ing.        | 22                   | 35      | 8.5         | 6                     | 2.2         |
| L. Dir. Ing.         | 20                   | 33      | 10.3        | 2                     | .58         |
| Bil. Dir. Ing.       | 13                   | ...     | 9.3         | 2                     | .81         |
| Femoral              | 1                    | 1       | 9.          | 0                     | .0          |
| Rt. Post. Op. Ing.   | 15                   | 15      | 9.          | 4                     | 3.3         |
| L. Post. Op. Ing.    | 18                   | 18      | 9.5         | 4                     | 2.3         |
| Umbilical            | 4                    | 4       | 9.5         | 1                     | 2.6         |
| Epigastric           | 3                    | 3       | 10.         | 1                     | 3.3         |
| Post. Op. Incisional | 8                    | 8       | 12.         | 1                     | 1.1         |
| Total                | 379                  | 445     |             | 78                    | Average 1.7 |

The total number of injections in this series of cured cases was 4561.

## CHART NUMBER 4

Summary of Complications in All Patients Treated  
Whether Cured or Not Cured

|                  | Induration<br>Cord | Skin<br>Erosion | Hydrocele | General<br>Reaction | Coryza | Edema<br>Leg | Chemical<br>Peritonitis | Epididymitis | Dermatitis | Hematoma | Abscess | Gangrene<br>of Bowel | Totals |
|------------------|--------------------|-----------------|-----------|---------------------|--------|--------------|-------------------------|--------------|------------|----------|---------|----------------------|--------|
| Right Indirect   | 23                 | 5               | 4         | 2                   | 2      | 2            | 1                       | 0            | 0          | 2        | 2       | 0                    | 43     |
| Left Indirect    | 21                 | 3               | 5         | 5                   | 0      | 2            | 2                       | 1            | 0          | 0        | 0       | 0                    | 39     |
| Bilat. Indirect  | 7                  | 1               | 2         | 1                   | 2      | 0            | 0                       | 0            | 1          | 0        | 0       | 1                    | 15     |
| Right Direct     | 6                  | 1               | 1         | 2                   | 1      | 2            | 0                       | 0            | 0          | 0        | 0       | 0                    | 13     |
| Left Direct      | 3                  | 2               | 1         | 1                   | 0      | 0            | 1                       | 0            | 0          | 0        | 0       | 0                    | 8      |
| Bilat. Direct    | 1                  | 2               | 1         | 0                   | 0      | 1            | 1                       | 0            | 0          | 0        | 0       | 0                    | 6      |
| Formal           | 0                  | 0               | 0         | 0                   | 0      | 0            | 0                       | 0            | 0          | 0        | 0       | 0                    | .0     |
| Rt. P. O. Ing.   | 5                  | 1               | 1         | 1                   | 0      | 0            | 0                       | 0            | 0          | 0        | 0       | 0                    | 8      |
| L. P. O. Ing.    | 6                  | 0               | 2         | 1                   | 0      | 0            | 0                       | 0            | 0          | 0        | 0       | 0                    | 9      |
| Umbilical        | 0                  | 0               | 0         | 1                   | 0      | 0            | 1                       | 0            | 0          | 0        | 0       | 0                    | 2      |
| Epigastric       | 0                  | 0               | 0         | 2                   | 0      | 0            | 0                       | 0            | 0          | 0        | 0       | 0                    | 2      |
| P. O. Incisional | 0                  | 2               | 0         | 0                   | 0      | 0            | 0                       | 0            | 0          | 0        | 0       | 0                    | 2      |
| Totals           | 72                 | 17              | 17        | 16                  | 5      | 7            | 6                       | 1            | 1          | 2        | 2       | 1                    | 147    |

**Systemic Reaction:** We are definitely aware of the fact that a number of individuals experience systemic reactions after the injection of the solutions. This has been observed following the injection of the tannic acid-alcohol solutions and to a much less extent following the injection of the soap solution. These systemic reactions have been manifest by fever, coryza, muscle aches and a sensation of impending influenza. Reactions such as this were not recorded on the

charts in most instances because the patients have only subsequently informed us of them on the date of their next visit, so that we have not been able to make the objective finding. They were so definitely associated with the injection that there seems to be no doubt in our minds of their relation to the injections.

*Induration of the Cord:* Induration of the cord was one of the most commonly observed complications in our series. This condition was observed more frequently when we were using a strong tannic acid-alcohol-phenol mixture but even then it only rarely incapacitated the patient. This condition has been designated by others as

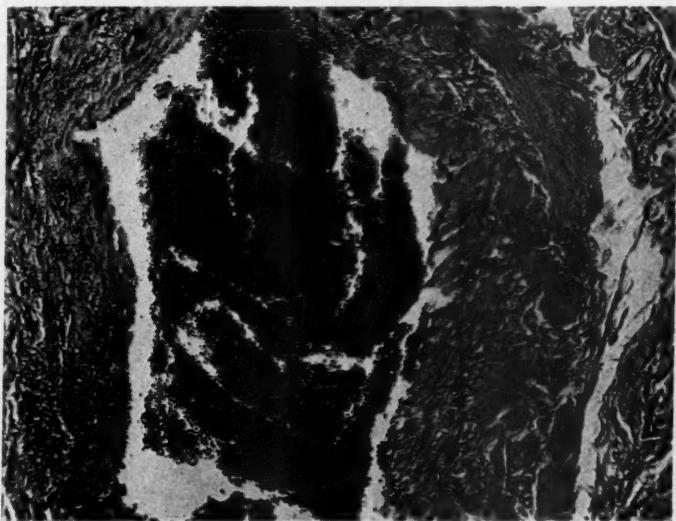


Fig. 1. Edema of the cord without evidence of thrombophlebitis. The specimen is from an elderly patient who requested operation for the cure of his hernia about two weeks after the injection.

"swollen cord", "hydrocele", "thrombophlebitis of the cord", and so forth, but these terms do not represent the true pathologic condition of the involved structure. Histologic sections taken from an elderly patient who developed this condition and then requested an operation for the cure of his hernia revealed edema of the spermatic cord without any evidence of thrombophlebitis. (Fig. 1.) The serous surfaces of the hernial sac were held together with delicate fibrinous adhesions. (Ten days previously and a few days after the offending injection had been made, this hernial sac had been aspirated and clear yellowish fluid had been obtained.) Histologic section revealed young fibrous tissue opposing the two serous surfaces of the hernial sac. (Fig. 2.)

This condition, though not desirable because of the pain and discomfort which it produces, incident to its occurrence, results in an obliteration of the hernial sac and assures a more definite closure of the hernia. It is the authors' opinion that this, in a milder degree, is the fate of the hernial sac in all cases. This opinion is based on the examination of one individual who had been pronounced cured of his hernia and subsequently required an appendectomy. Examination of the internal ring, from within the peritoneal cavity, revealed that the hernial sac had been obliterated though the patient had never developed an induration of the cord during the course of his

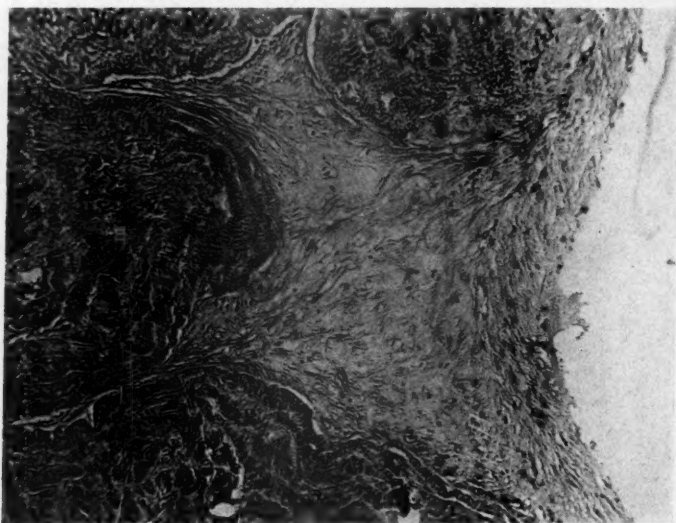


Fig. 2. Young fibrous tissue opposing the two serous surfaces of the hernial sac. From the same case as in Fig. 1.

treatments. (This case has now been recorded<sup>19</sup>.) More substantiation of this fact will be forthcoming only as we are able to repeat this experience.

*Chemical Peritonitis:* Chemical peritonitis has been observed in 6 instances. It results from the intraperitoneal injection of the irritating solution, and unless there has been injury of the bowel it will disappear spontaneously. Rest and heat to the abdomen are indicated.

*Peritoneal Irritation:* Peritoneal irritation may be manifested by acute pain in the abdomen which subsides within 2 or 3 hours and leaves no bad effects. It is produced from an injection placed adja-



cent to or within the peritoneal lining. This occurred 16 times in our series.

*Hematoma:* Hematoma at the site of the injection has been observed on two occasions and is the result of inadvertently puncturing an adjacent vessel. Aspiration before injection is made will help a great deal to avoid this complication.

*Abscess:* Abscess formation may result from a break in aseptic technic, the care of which must always be meticulously guarded. This condition is more apt to occur if injections are made through skin which has become irritated or macerated by the truss. In the two instances in which this complication was observed it was definitely attributable to errors in technic.

*Superficial Ulceration of the Skin:* Superficial ulceration of the skin as a result of truss irritation can be guarded against by having the patient become gradually accustomed to its pressure before starting treatments. This complication was observed in 17 cases. In every instance the erosion healed when the truss was removed for a few days and the skin treated.

No case of atrophy of the testicle attributable to the injection has been observed in our clinic. No case of impotence has been reported to us from any of these patients. No deaths have resulted from any of the cases treated in our clinic.

### CONCLUSIONS

The available reported results and complications following the injection treatment of hernia appear to be no less favorable than those which have been reported from the operative method.

In a selected group of cases this method of treatment for hernia appears to have a very definite field of usefulness.

It is by no means applicable in all cases of hernia and unless the proper indications are observed the method will again fall into disrepute.

It is recommended that those who wish to employ this method acquaint themselves with the necessary details before endeavoring to treat patients in order that a rational, ambulatory, supplementary procedure for the treatment of hernia be not abused.

### REFERENCES

1. Andrews, Edmund, and Bissell, A. D.: Direct Hernia: A Record of Surgical Failures, Surg., Gynec. & Obst. 58: 753-761 (Apr.) 1934.
2. Bratrude, A. F.: Ambulant Treatment of Hernia, Journal-Lancet 53: 673-674 (Dec. 15) 1933.

3. Bratrude, A. F.: The Ambulant Treatment of Hernia, *Minnesota Med.* 18: 441-451 (July) 1935.
4. Block, Werner: Bericht über eine Sammlung von 20, 199 Leistenbruchoperationen. (Rezidive), *Arch. f. klin. Chir.* 175: 607-624, 1933.
5. Cattell, R. B. and Anderson, Claude: End Results in the Operative Treatment of Inguinal Hernia: A Report of 150 Cases at the Lahey Clinic, *New England J. Med.* 205: 430-432 (Aug. 27) 1931.
6. Campos and Subirachs: Tratamiento de las hernias por el metodo fibrogenico, *Informacion Med.* 6: 155-185 (July, Aug.) 1929.
7. Gibson, C. L., and Felter, R. K.: End Results of Inguinal Hernia Operations, *Amer. J. Surg.* 92: 744-753 (Oct.) 1930.
8. Goldhahn, R.: Über schwere Schädigungen nach Bruchbehandlung mittels Alkoholinjektionen, *Klin. Wchnschr.* 9: 1447-1449 (Aug.) 1930; 1968-1969 (Oct.) 1930.
9. Gray, St. G. B.: Injection Treatment of Inguinal Hernia, *Brit. M. J.* 2: 12-14 (July 2) 1932.
10. Jacobi, H.: Schwere Schädigung nach Bruchbehandlung mittels Alkoholinjektionen, *Klin. Wchnschr.* 10: 71 (Jan. 10) 1931.
11. Jameson, F. S.: The Treatment of Hernia by Injection, *Clin. Med. & Surg.* 38: 172-175 (March) 1931.
12. Kretzschmar, K. E.: The Injection Treatment of Hernia, *Clin. Med. & Surg.* 42: 371-375 (Aug.) 1935.
13. LaRochelle, A. D.: Injection Treatment of Hernia, *Clin. Med. & Surg.* 40: 49-51 (Jan.) 1933.
14. Mayer, Ignatz: The Treatment of Hernia by Subcutaneous Injection, *Med. J. & Record* 125: 528, 596, 672, 1927; 128: 415, 1928; 131: 90, 1930.
15. Wolfe, Ralph: Injection Treatment of Inguinal Hernia, *Med. J. & Record* 133: 243-246 (March 4) 1931.
16. Wollermann: Die Timmermannsche Injektionsmethode in den letzten 25 Jahren, *Aertztl. Rundschau* 39: 283-284 (Sept. 25) 1929.
17. Wyss, Franz: Die Behandlung der Hernien mit Alkoholinjektionen, *Schweiz. med. Wchnschr.* 59: 85-89 (Jan. 26) 1929.
18. Warren, Joseph: Hernia. London: C. N. Thomas, 1881.
19. Rice, Carl O., and Larson, L. M.: The Fate of the Hernial Sac in Hernia Treated by the Injection Method, *West. J. Surg.* 44: 428-429 (July) 1936.

# The Southern Surgeon

*Published Bi-monthly by*

*The SOUTHERN SURGEON PUBLISHING COMPANY*

478 Peachtree Street, N. E.  
ATLANTA

L. MINOR BLACKFORD, M.D.  
*Editor*

B. T. BEASLEY, M.D.  
*Managing Editor*

ROY B. MCKNIGHT, M.D.  
*Associate Editor*

GILBERT F. DOUGLAS, M.D.  
*Assistant Editor*

AUGUSTUS STREET, M.D.  
*Assistant Editor*

Copyright 1936

---

---

VOLUME V

OCTOBER, 1936

NUMBER 5

---

---

## THE C. JEFF MILLER LECTURE

When the Executive Council of The Southeastern Surgical Congress unanimously decided to honor the memory of our late President, Dr. C. Jeff Miller, of New Orleans, by establishing an annual lecture, it paid lasting tribute to the memory of one whose contributions to medicine were outstanding, and whose place among North American surgeons is secure. His passing was a tragedy to his friends, colleagues, students, and legion of admirers who bow to destiny with emotion, but with a knowledge that he submitted to the inevitable lot of man with characteristic intrepidity and fortitude.

My first association with Dr. Miller came years ago when he was President of the Southern Surgical Association, and I, a surgical neophyte, was admitted to membership in that body. Impressed by the dignity, courtesy, and efficiency with which he conducted the meetings, and the effectiveness with which administrative problems were disposed of as they presented themselves, an admiration for his courtliness and kindness, which in later years ripened into friendship, was inevitable. With the passing of years this admiration for a brilliant intellect, an amazing erudition, and a sturdy courage both as a surgeon and a man, developed into sincere devotion to one whose life was a drama of simplicity and grandeur at once appealing, fascinating, and inspiring.

A native of Tennessee, Dr. Miller graduated from the University of the South, Sewanee, Tennessee, and following his internship and

a short term of practice in association with Dr. Eve, located in New Orleans where he practiced his profession over a long period of years until his death.

Although inclined to the practice of general surgery in the early stages of his professional career, he soon manifested an interest in gynecology and for the last thirty years had limited himself to obstetrics, gynecology, and abdominal surgery, in 1911 becoming Professor of Gynecology at the Tulane University School of Medicine and Graduate School of Medicine.

Dr. Miller's scholarly attainments, his interests outside of medicine, and the impressive dignity of his manner made him a teacher par excellence. Not only was he a great clinical teacher, but he possessed in addition a technical ability of brilliance which together with a pleasing gift of expression, made his class rooms and operating theater popular with students and colleagues alike.

During the long period of service as head of the Department of Gynecology, Dr. Miller found time to lend his aid and interest to the cause of organized medicine in America and was a well-known figure in the Councils of the American Medical Association and the American College of Surgeons. He served with distinction as Chairman of the section on Gynecology, Obstetrics, and Abdominal Surgery of the American Medical Association in 1912, and was a member of the Board of Regents and past President of the American College of Surgeons. Other surgical societies, notably the Southern Surgical Association, The Southeastern Surgical Congress, and the American Gynecological Society honored him by making him their President at various times.

During the World War he answered his country's call, serving as a member of the General Medical Board of the Council of National Defense, with the rank of Major in the Medical Corps.

In addition to his other distinguished services, as a writer Dr. Miller's contributions to clinical surgery and pathology were notable. He was the author of two widely known textbooks, "An Introduction to Gynecology", and "Clinical Gynecology", and in addition, a large number of papers on clinical surgery.

A master surgeon who thought clearly, modestly, and unprejudicedly, he lived simply and blended humanitarianism with his skill and understanding. Dignified in appearance, cultured in manner, possessed of an immaculate surgical conscience, he practiced medicine both as an art and a progressive science in a manner given to few. The impress of his personality and his professional achievements will remain as a profound influence not only on the surgery



of the South, which he loved so well, and where his work was done, but upon the surgery of North America.

His associates knew him as a wise and patient counselor who measured success by service and who stimulated his colleagues and students to better efforts by their very contact with him. Of few men can it be said as truly as of Dr. Miller that he was not only a scholarly, forward-looking, master surgeon interested in research, a dynamic teacher of profound knowledge, pleasing address, and a style lucid in the lecture room or during the operative clinic, but in addition, an artist who delighted in the subtle emotions of music and literature.

Too infrequently does there develop in the medical profession such an engaging character of indomitable courage and iron will, unwilling to compromise principles, and forward-looking in his scientific bent, who possesses as did our late President a charm, determination, mature surgical judgment, and research ability which the medical profession can ill afford to lose. What more fitting an honor can The Southeastern Surgical Congress, of which he died the President, reward his memory than to establish in his honor the annual C. Jeff Miller lectureship?

FRED W. RANKIN, M. D.

#### A-15

The American Medical Directory lists after the name of the individual physician the special societies "that are National and Interstate in name and scope" to which he belongs. It is with a sense of some satisfaction that THE SOUTHERN SURGEON invites attention to the fact that the fourteenth edition of this Directory, just off the press, has recognized The Southeastern Surgical Congress as one of twenty-four such surgical societies and has placed after the name of each Fellow the symbol "A-15."

## BOOK REVIEWS

*The Editors of THE SOUTHERN SURGEON will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

**THE ART OF TREATMENT.** By WILLIAM R. HOUSTON, A. M., M. D., F. A. C. P., Formerly Professor of Clinical Medicine, University of Georgia; formerly Visiting Professor of Medicine, Yale-in-China. 744 pages. Price, \$5. New York: The Macmillan Company, 1936.

Those who attended the 1933 Assembly of The Southeastern Surgical Congress in Atlanta will remember Dr. Houston's delightful oration, "The Need for Action." This paper, incorporated in the present volume, is a good sample of the dry wit, the charm and culture and, above all, the superlative common sense of the author.

The good surgeon, and other surgeons are hardly interested in this journal, is primarily a doctor: he wishes to avoid unnecessary operations, realizes that often less radical measures are for the best interests of the patients. He will therefore enjoy this book. Indeed this book should be owned by all physicians who admired the writings of Osler. The reviewer is familiar with no other medical author (except Walter Alvarez) of modern times who has written quite so well. He believes that Houston's "The Art of Treatment" should and will rank with Osler's "The Principles and Practice of Medicine."

---

**THE THYROID. SURGERY, SYNDROMES, TREATMENT.** By E. P. SLOAN, M. D. Edited by Members of the Sloan Clinic. 475 pages with 99 illustrations. Price, \$10. Springfield and Baltimore: Charles C Thomas, 1936.

Though Hippocrates, we have all heard, fed his goiter patients seaweed rich in iodine, and important study of the disease was undertaken in the nineteenth century, successful operations on the thyroid were very rare until the twentieth. By 1910 the problem had been attacked with enthusiasm by men in different parts of the world and we may take pride in the fact that no country has contributed as much to the great progress in this field as our own. Nor is it surprising that the thyroid is still of lively interest.

Along with the great American pioneers in goiter surgery, Halstead, Mayo, Crile, Hertzler, must be placed the late E. P. Sloan. A student of Kocher's, the founder of the American Association for the Study of Goiter, the chief of the Sloan Clinic where more than 15,000 goiter operations have been performed, his posthumous book must be received with interest and respect.

Dr. Sloan introduced a number of things in the technic of thyroid surgery. The chapters on technic are particularly good and the illustrations excellent. But Dr. Sloan was far more than a clever operator. This book, with its large bibliography, proves again and again that he was a profound student. It includes also admirable sections on the parathyroids and the thymus.

Sloan agreed with Plummer in separating the toxic adenoma from the exophthalmic goiter. With Plummer too, he considered digitalis futile in the treatment of the cardiac manifestations of goiter. He attached considerable importance to infection and intestinal toxemia as etiologic factors. He thought very little of radiation as a therapeutic agent.

That Charles C Thomas published the work is enough to be said as to its typographical excellence. Every surgeon interested in the thyroid will want to add this volume to his working library.

A TEXTBOOK OF PATHOLOGY. By W. G. MACCALLUM, M. D., Professor of Pathology and Bacteriology, The Johns Hopkins University, Baltimore. Sixth edition, entirely reset. 1277 pages with 697 illustrations. Price, \$10. Philadelphia and London: W. B. Saunders Company, 1936.

MacCallum's Pathology is a well established classic in medical education and it is a pleasure to welcome the sixth edition. The general plan of the book resembles that of 1916 but there are many references to literature of 1935 and some even in 1936. Most of it has been rewritten, and many conditions undreamt of at the times of earlier editions have been described. The sections on tumors are a bit skimpy. Dr. MacCallum's lucid style still prevails and it is still delightful.

The reviewer notes about 250 illustrations which have been added since he used an earlier edition in medical school. Many of these are photomicrographs of unusual excellence. He notes with regret that several of his old favorites have been omitted, but on the whole the new cuts are an improvement. Though the picture of the rectal stricture remains the same, it is of interest to note in the legend that the cause of it is now attributed to lymphogranuloma inguinale instead of syphilis. MacCallum's remains probably the best illustrated textbook of pathology, and illustrations constitute a vital part of such texts.

## WOUND CLOSURE

*Quicker & Better*

# Justrite

## MICHEL'S SKIN CLIPS

NON-RUSTING

The ideal skin suturing material. Unexcelled bending strength and excellent sharp points. At your supply house in the Justrite patented packages.

Ask your dealer for free sample package or write us giving dealer's name



NONE GENUINE WITHOUT THIS TRADE-MARK

## CLAY-ADAMS Co.

Exclusive Wholesale Distributors

15 EAST 26th STREET • NEW YORK

## MALECOT (*Casper*)

SELF-RETAINING

## DRAINAGE CATHETERS

NONE BETTER



WORLD'S BEST



MADE BY ORIGINAL RUSCH "The World's Best"

D-1131

Made of fresh red Para rubber compound that assures long wear. Will withstand repeated sterilization. Reinforced bend, funnel ends, glass moulded—smooth satin finish.



No. D-1130

PRICES

|                                    |        |
|------------------------------------|--------|
| D-1130                             | 2 wing |
| \$1.25 each, all even sizes, 12-30 |        |
| \$2.00 each, all even sizes, 32-40 |        |
| D-1131                             | 4 wing |
| \$1.50 each, all even sizes, 12-30 |        |
| \$2.25 each, all even sizes, 32-40 |        |

AT YOUR DEALER—or write to (giving Dealer's name)

## CLAY-ADAMS Co.

Exclusive Wholesale Distributors

25 EAST 26th STREET • NEW YORK

## CLAY-ADAMS Co.

Exclusive Wholesale Distributors

25 EAST 26th STREET • NEW YORK

*The Southern Surgeon*, the second regional journal devoted to a specialty in the United States, is published by The Southern Surgeon Publishing Company, a subsidiary of The Southeastern Surgical Congress, for the advancement of surgery particularly in the South. In addition to publishing papers irrespective of their origin, it aspires to encourage surgeons in the Southern States to record their own observations and original work.

Manuscripts for publication, books for review, and correspondence relating to the editorial management should be sent to the Editor-in-Chief, Dr. L. Minor Blackford, 104 Ponce de Leon Ave., N. E., Atlanta, or to one of the other editors. Other communications should be addressed to Dr. B. T. Beasley, 701 Hurt Building, Atlanta.

Articles will be accepted for publication on condition that they are contributed solely to *The Southern Surgeon*. Manuscripts must be typewritten, double-spaced, and the original copy should be submitted. They are all subject to editing. The cost of illustrations must be borne by the author.

References should conform to the style of the Quarterly Cumulative Index Medicus, published by the American Medical Association. This requires, in order given: name of author, title of article, name of periodical, with volume, page, month (day of month if weekly) and year.

Matter appearing in *The Southern Surgeon* is covered by copyright, but, as a rule, no objection will be made to its reproduction in reputable medical journals, if proper credit is given. However, the reproduction for commercial purposes will not be permitted.

*The Southern Surgeon*, formerly a quarterly, is now published six times a year. Subscription price in the United States and Canada: \$4.00; in other countries: \$5.00, including postage. Single Copies, \$1.00 postpaid.

Checks may be made payable to The Southern Surgeon Publishing Co.



